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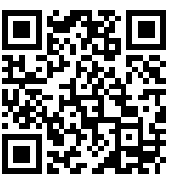

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THE ROYAL ENGINEERS JOURNAL.

Vol. XXVII. No. 1. JANUARY, 1918.

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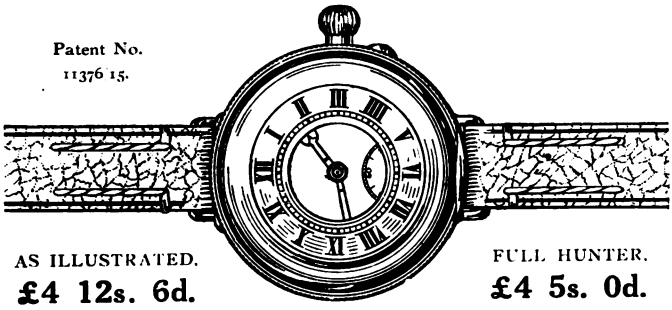

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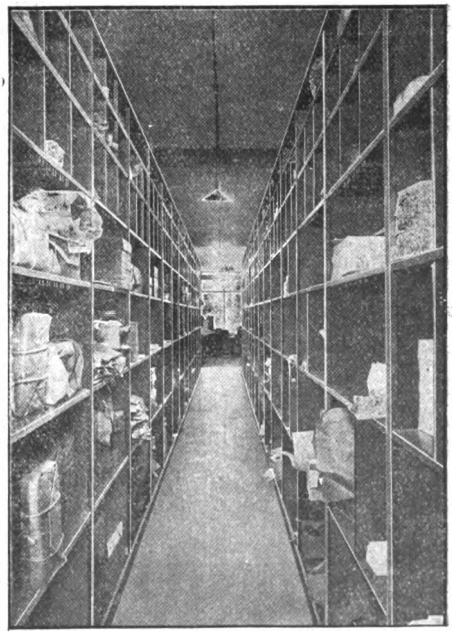

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TARPAULIN WATER TANK.

By LIEUT.-COLONEL ARTHUR A. CROOKSHANK, R.E.

THIS reservoir was designed, on field service, to take a 30-ft. × 30-ft. canvas tarpaulin (without eyelet holes). The water capacity of the reservoir is about 11,500 gallons.

The absence of eyelet holes reduces the capacity of the reservoir, as the edge of the canvas has to lie horizontally on top of the top rail instead of hanging vertically by the eyelet holes.

With a 30-ft. × 30-ft. tarpaulin a depth of 5 ft. in round figures gives the maximum capacity, but in actual construction on field service a height of 5 ft. is too expensive and too heavy in materials. The depth is made 4 ft., as being more practical; the percentage difference between the capacity of 5 ft. and that of 4 ft. is small.

The canvas should be hung loose, *i.e.*, when in its final position it should not be taut; this helps to prevent the canvas from being under strain.

The tarpaulin, also the corrugated iron sheets to be tarred both sides; all squared timber and all natural (forest) timber up to 1 ft. above ground level to be tarred also.

The tarpaulin is liable to be moved out of position by wind pressure when the tank is empty or nearly empty.

It is therefore held in position by a skirting of 4-in. × 3-in. timber with one corner rounded off, round the edge of the floor, and by vertical timbers 3 in. × 3 in. at each corner, also at 7-ft. intervals in the walls, the corner posts to have one corner rounded off.

The skirting is held by an octagonal framework of 3-in. × 3-in. timber laid on the floor of the tank.

Roof.—If suitable materials (*i.e.*, for long rafters) are available the roof to be of the pyramidal type, as per design herewith. Roof covering to be of wire netting pulled taut, covered with canvas for horse water or felt for drinking water.

The outer covering to be coloured to match the surrounding ground, or else painted with lizard, tiger or leopard skin markings.

A small hinged opening in the roof covering to give access to the interior of the reservoir.

Foundations.—With foundations of the floating raft type, drainage is important; all surface water must be run off rapidly. The site to be protected by a barbed-wire fence.

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Overflow.—A tell-tale to be provided if the tank is visible from the pumping station; if not, a telephone or electric bell. Also an overflow pipe.

Variations.—This reservoir was designed with floor level 12 ft. above ground level in order to provide a sufficient head of water for rapidly filling water carts and water lorries.

If this head is not required a similar design of reservoir can be built with floor at ground level.

If required for rapid work in following close on the heels of an advance in offensive operations, or under shell fire, a similar design of reservoir can be made of portable type by having the walls, etc., in two sections each, joined by bolts, wedges, or clamps, so that the whole can be packed on to a lorry and quickly erected on site.

CALCULATIONS FOR A WATER RESERVOIR TO TAKE A 30-FT. × 30-FT. TARPAULIN. WATER CAPACITY ABOUT 11,500 GALLONS.

By MAJOR N. W. BENTON, R.E.

RULING DIMENSIONS.

Ruling dimensions for purposes of calculation :—

Depth = 4 ft.
Sides = 21 ft.
Height above ground = 12 ft.

FLOOR.

Use 1-in. timber.
Find spacing of floor joists.
Load = 4 ft. of water = $4 \times 62{\cdot}5 = 250$ lbs. per square foot.
Consider strip of floor 12 in. broad.

$$M_f = \frac{wl^2}{8} = \frac{250}{12} \times \frac{l^2}{8}.$$

$$M_r = \frac{1}{6} rbd^2 = \frac{1}{6} \times 1200 \times bd^2 = 200 \times 12 \times 1^2.$$

$$\therefore \quad l^2 = \frac{12 \times 8}{250} \times 200 \times 12 = \frac{4032}{25} = 161{\cdot}28.$$

$$l = 12\tfrac{1}{2} \text{ in.}$$

Assume 12 in. centre to centre.

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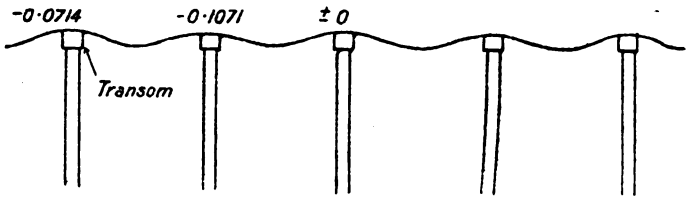
Floor Joists.

Assume that the floor joists rest on five transoms supported on five pillars.



Assume that floor joists broken at centre transom, and that they are continuous from centre to end of cantilever.

Refer p. 490, *Trautwine*, Edition 1913, for factors for continuous beams. As in this case a cantilever has to be allowed for, count the outside pillar as being the centre support of a continuous girder. The factors to choose are therefore those for four spaces. The cantilever can then be chosen of such length as, with the load of the floor on it, give it the same strain as the continuous beam would have had. To find this length compared with that of space between transoms we have

$$M_f \text{ (of cantilever)} = \frac{wl^2}{2}.$$

$$M_f \text{ (of continuous beam)} = \cdot 0714 wl^2 = \frac{wl^2}{14}.$$

$$\therefore \quad l^1 = \sqrt{\frac{1}{7}}\, l$$

$$= \cdot 378 l \text{ (by slide rule).}$$

Now $4l + 2l^1 = 21$ ft.,

i.e. $l(4 + \cdot 756) = 21$,

i.e. $l = 4 \cdot 42$ ft. or $53 \cdot 1$ in.

$\therefore$ $l^1 = 20 \cdot 1$ in.

Assume spaces $= 4\frac{1}{2}$ ft., *i.e.* 54 in.

Cantilever $= 1\frac{1}{2}$ ft., *i.e.* 18 in.

To calculate the size of floor joists take the greatest M_{ff} which is a negative one, viz. :—

$$M_{ff} = \cdot 1071 wl^2 = \frac{wl^2}{9 \cdot 34} = \frac{250 \times (54)^2}{12 \times 9 \cdot 34}.$$

$$M_r = \frac{1}{6} rbd^2 = 200bd^2.$$

$$\therefore \quad bd^2 = \frac{250 \times (54)^2}{12 \times 9 \cdot 34 \times 200}$$

$$= \frac{7290}{224}$$

$$= 32 \cdot 5.$$

$\therefore$ *4 in.* $\times$ *2 in.* good enough for floor joists.

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TRANSOMS.

Assume that the load of the floor joists is a distributed load on the transoms.

Use same diagram and factors as above for floor joists, the transoms being assumed broken at the centre pillar and overhanging at ends.

$$\text{Distributed load} = (4\tfrac{1}{2})^2 \times 4 \times 62\tfrac{1}{2} = 5060 \text{ lbs.}$$

$$M_{ff} = \frac{wl}{9{\cdot}34} = \frac{5060 \times 54}{9{\cdot}34}.$$

$$M_r = 200bd^2.$$

$$bd^2 = \frac{5060 \times 54}{9{\cdot}34 \times 200}$$

$$= \frac{1365}{9{\cdot}34},$$

$$= 146{\cdot}2.$$

Following will do:—

7 in. × 3 in.,
or twice 7 in. × 1½ in.
or „ 5 in. × 3 in. } most convenient.

To check strength of cantilevers.
Assume theoretical length.

$$\text{Distributed load} = \frac{4\tfrac{1}{2} \times 20{\cdot}1}{12} \times 62\tfrac{1}{2} = 2120 \text{ lbs.}$$

$$M_f = \frac{wl}{2} = \frac{2120 \times 20{\cdot}1}{2}.$$

$$M_r = 200bd^2.$$

$$bd^2 = \frac{2120 \times 20{\cdot}1}{2 \times 200}$$

$$= 5{\cdot}3 \times 20{\cdot}1$$

$$= 107 \text{ (which is less than } bd^2 \text{ for transom).}$$

UPRIGHTS OR PILLARS.

Height, 12 ft.
Max. load = 5060 lbs. = 46·2 cwt.
From Diagram, *Plate* 57, *Manual Field Engineering*, it appears that a pit prop 7½ in. mean diameter is sufficient.

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Sides of Reservoir.

To be made of corrugated iron 7 ft. × 2 ft. supported at the ends and centre.

As no data available an experiment had to be carried out on 7-ft. sheets.

There are two thicknesses of corrugated iron available.

Thin size over 6-ft. gap will just carry 218 lbs. distributed.

Thick „ „ „ „ „ „ „ 392 „ „

Width of corrugated iron is 22 in.

Therefore *for gaps of 3 ft. 6 in.* and for strips 1 ft. wide

Thin size would carry 105·6 lbs. per foot-run or square foot.

Thick „ „ „ 189 „ „ „ „ „ „ „

The pressure of water at bottom of side is

$$= 4 \times 62\tfrac{1}{2} = 250 \text{ lbs. per square foot.}$$

If the sheets are laid lengthways along the sides it will be necessary to use along lower portion of side two thick sheets, along upper portion of side one thick sheet, as above figures do not allow for the corrugated-iron sheets recovering.

Supports to Corrugated Iron.—Calculate support as beam.

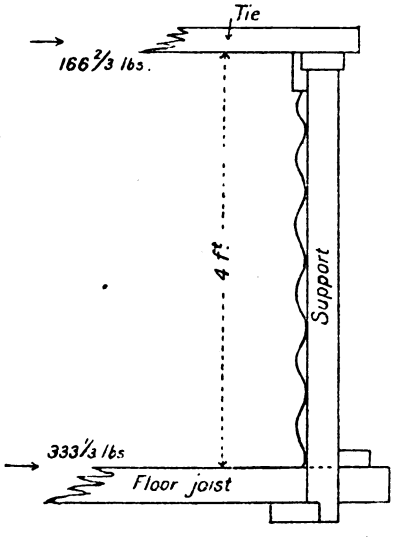
Load.—The pressure of the water on the sides is as the depth in feet per square foot = d, say.

The total pressure on side = $\frac{1}{2} \times 4^2 \times 62\frac{1}{2} = 500$ lbs. per foot-run.

The centre of pressure is $\frac{1}{3}$ of depth from bottom = $\frac{4}{3} = 1\frac{1}{3}$ ft.

The reaction on top of beam = $166\frac{2}{3}$ lbs. per foot-run.

„ „ „ bottom „ = $333\frac{1}{3}$ „ „ „ „



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Using calculus.

M_f at any point z ft. from top

$$= 166\tfrac{2}{3}z - 62\tfrac{1}{2}\int_0^{\circ}(z-d)\,.\,d\,.\,dx$$

$$= 166\tfrac{2}{3}z - 62\tfrac{1}{2}\Sigma z\left(\frac{zd^2}{2} - \frac{d3}{3} + K\right)$$

$$= 166\tfrac{2}{3}z - 62\tfrac{1}{2}\,.\,2^3\,.\,\tfrac{1}{6}$$

$$= \tfrac{500}{3}(z - \tfrac{1}{16}z^3).$$

$$\frac{dM_f}{dz} = \tfrac{500}{3}(1 - \tfrac{3}{16}z^2).$$

Equating to zero

$$z^2 = \tfrac{16}{3} = 2{\cdot}31 \text{ ft.},$$

i.e. max. M_{ff} is 2·31 ft. from top.

To calculate M_{ff} of beam treat this portion as cantilever.

$$\Sigma_{2{\cdot}31}^{\circ} M_{fs} = 62\tfrac{1}{2}\int_{2{\cdot}31}^{\circ}(2{\cdot}31-d)\,d\,.\,dx$$

$$= 62\tfrac{1}{2} \times (2{\cdot}31)^3 \times \tfrac{1}{6} = 129 \text{ ft.-lbs.} = 1542 \text{ in.-lbs.}$$

$$M_r = 200bd^2.$$

$$\therefore \quad bd^2 = \tfrac{1542}{200} = 7{\cdot}71 \text{ per foot-run.}$$

$\therefore$ for 3-ft. 6-in. run

$$bd^2 = 27.$$

Supports 4 in. × 2 in. would suffice.

But for jointing corrugated iron, etc., take 4 in. × 3½ in.

If calculated as cantilever.

Calculation for cantilever supports :—

$$\Sigma_4^{\circ} M_{fs} = 62\tfrac{1}{2}\int_4^{\circ}(4-d)\,d\,.\,dx$$

$$= 62\tfrac{1}{2} \times 4^3 \times \tfrac{1}{6}$$

$$= 1000 \times \tfrac{2}{3}$$

$$= 666 \text{ ft.-lbs.}$$

$$= 7992 \text{ in.-lbs. per foot-run.}$$

$$M_r = 200ba^2.$$

$$\therefore \quad bd^2 = 39{\cdot}96 \text{ per foot-run,}$$

i.e. 5 in. × 1½ in. „ „ „

or 6 in. × 1⅛ in. „ „ „

$\therefore$ for 3-ft. 6-in. length require 6 in. × 4 in.

Footing of Cantilevers.

M_{ff} on cantilever = 7992 in.-lbs.

Dist. between footings = 4 in.

$\therefore$ pressure on lower footing = 2000 lbs.

„ „ upper „ = 2500 lbs. = 22·3 cwt.

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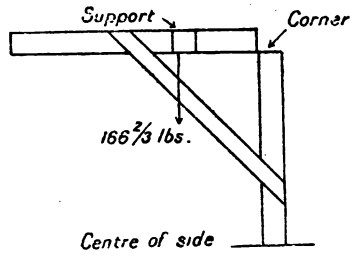
From p. 84, *Military Engineering*, Part IIIA., and allowing factor of safety 3 and that upright may come $\frac{1}{3}$ distance between joists, *i.e.* allowing for 34 cwt. it appears $\frac{4}{5}$-in. grooved wire nails required to resist pressure of support at footing. Assume that support comes on top of a floor joist then strength of ribands required at footings will be

$$bd^2 = \frac{2500 \times 24}{4 \times 200} = 75,$$

i.e. 6 in. × 2 in. will suffice about,
or two 4 in. × 2 in. „ „ „
or 5 in. × 3 in. „ „ „

Top Rail of Side of Reservoir.—Calculate strength so as to allow for holding support on underneath side.



$M_B = \frac{2}{3} \times 21 \times 166\frac{2}{3} = 2330$ in.-lbs.

$bd^2 = \frac{2330}{200} = 11{\cdot}65,$

i.e. 4 in. × 1 in. would suffice,

but use 4 in. × 2 in.

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FELLING OF FACTORY CHIMNEY.

By CAPT. J. F. HASELDINE, R.E.

A FACTORY chimney was very badly cracked on all sides and for all the upper portion of its height. Some of the cracks had been filled fairly recently with cement mortar, and in all such cases the bricks had s ill further opened showing that the decay which had set in, had not been arrested. The traffic in the neighbourhood had increased, heavy motor lorries on the adjacent road, and a new broad-gauge railway passing the entrance to the yard set up considerable vibrations and earth tremors; it was consequently considered advisable to fell the chimney and so obviate any chance of it coming down unexpectedly. Permission of the owners was obtained.

The only clear ground on to which the chimney could be felled was in the direction of the entrance to the yard, and even on this line there was not sufficient length to throw the whole height of the stack in one operation; the yard entrance had buildings on either side and the clear gap between these buildings was only about 35 ft. It was consequently decided to fell the top 66 ft. 6 in., as a first measure, and the chimney—the total height of which was 130 ft. 6 in. —was prepared for demolition as shown on attached Section.

Foot irons were in existence on the inside of the chimney, and a stage was fixed inside just below the point marked " A—A " three holes about 15 in. high were cut in the wall on the side on which it was intended to throw the chimney, and openings also about 15 in. high were made on each adjacent side wall, the four brick pillars (the corner pillars each 18 in. square and the two intermediate pillars 15 in. × 18 in.) left by this operation, were calculated to carry half the brickwork above them with a factor of safety of four, the other half being carried on the back wall and the remaining portions of the side walls.

The charges were guncotton, and were calculated at half the amount laid down in the *Field Service Pocket Book*, it being considered sufficient to make the brick pillars fall and crumble and not necessary to blow them completely out. A heavy explosion might have caused the chimney to collapse in its vertical position, and for this reason the charges were placed outside the chimney thus avoiding any of the gases produced by the explosion causing undue pressure inside the shaft.

In order to lay the charges in the position shown B, B, C, and C, a light platform was fixed outside the chimney on cantilever baulks

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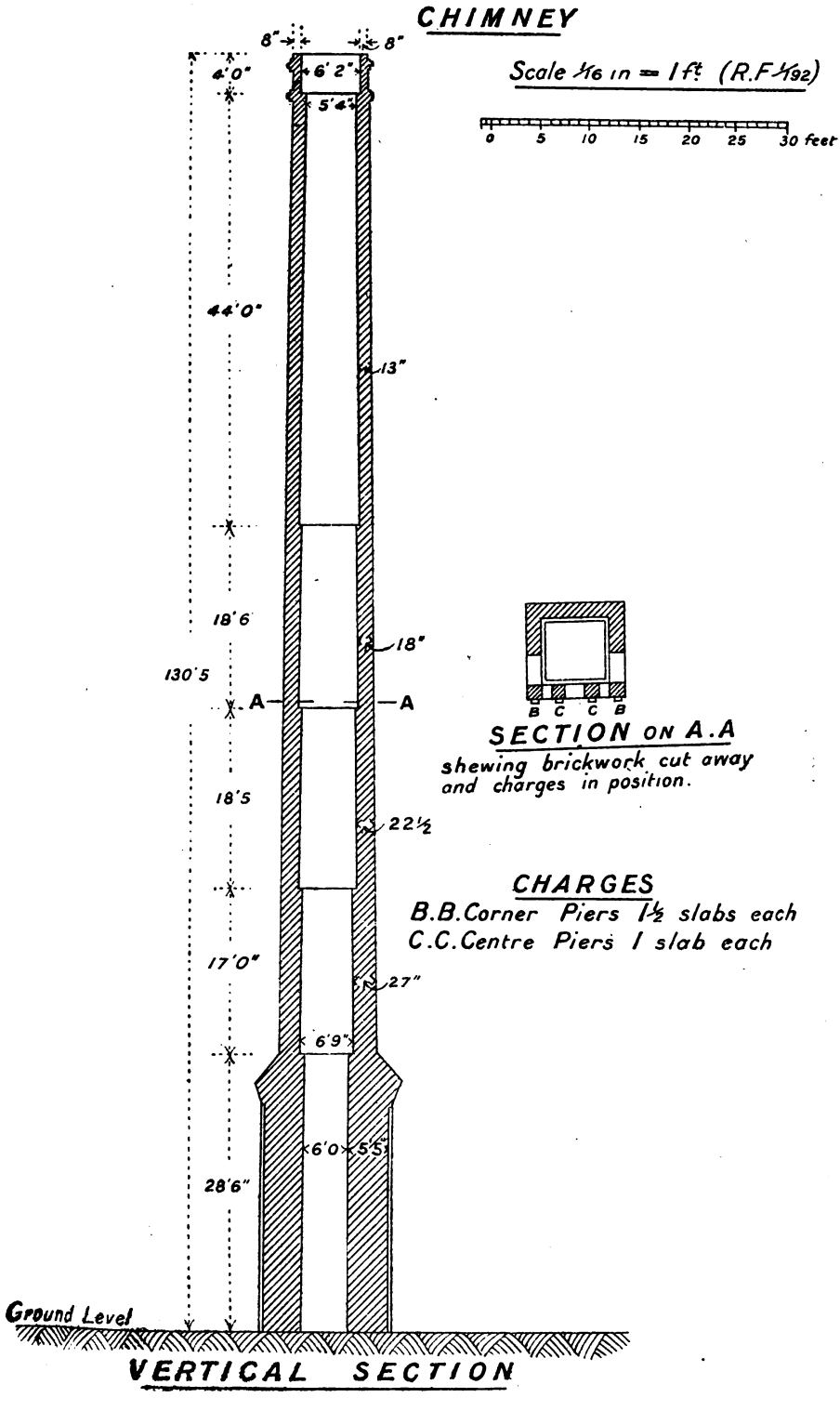

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pushed through the holes which had already been made, and the officer laying the charges crawling out through one of these holes. Just before the charges were fired the openings in the side walls were continued towards the back wall until each extended to a point 3 in. over the centre line of the chimney; this was done to ensure the stack falling as soon as the pillars in the front wall failed. The charges were fired electrically, the leads being carried to an exploder some 100 yards to the flank.

Immediately after the explosion occurred the chimney started to lean over in the required direction, and it was not until it had gone over about 20 degrees that a large piece slid off the back wall, and smashed in one side of the issue room roof—this was expected. The chimney fell in the space between two buildings and except for a hole about 3 ft. square in the weather-boarded wall of one of them no damage was done.

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REVIEWS.

THE LIFE OF SIR COLIN C. SCOTT-MONCRIEFF.

Edited by his Niece, MARY ALBRIGHT-HOLLINGS.—(12s. net. Murray, 1917).

THIS book is the work of many hands. Much of it is drawn from Sir Colin's own Reminiscences and letters, but contributions have been made by relatives and by friends who were associated with him in India Egypt, or at home. Among these may be mentioned his nephew, Sir George Scott-Moncrieff, Sir William Willcocks and Sir J. M. Dodds, his successor at the Scottish office. The Editor's part has been to " cement the whole together," and she has done this with the greatest care. A composite biography can never be quite as pleasant to read as one in which the materials have been fused together by a single author. Repetitions are inevitable, and the order of time is not always observed. The mere passing of the pen from one to another makes a break in the flow of the narrative. But biographers sometimes give us portraits which, however vivid, are not faithful, being coloured by their own personality. The reader who will go patiently through this volume from end to end will feel that he has gradually become possessed of a finished and trustworthy portrait of a most admirable man.

The October number of the *R.E. Journal* contained a Memoir of Sir Colin which makes it needless here to follow the steps of his career. But we want to know, not only what he did, but what he was, and this knowledge we get with unusual fulness from his own letters. He was a good letter-writer from the descriptive point of view, and he gave graphic accounts of the places he visited and the work on which he was engaged. But he was also unreserved about his own thoughts and feelings in writing to those who were dearest to him, who were often at home when he was abroad. Apart from what his friends tell us of him, his letters make the reader much more intimately acquainted with him than is usual with men of action.

In 1876, when engaged on irrigation work in India, he wrote to Gordon offering to serve under him in the Sudan. He said :—" I cannot pretend to any constructive talent, or scientific knowledge, and I am most ignorant of mechanical engineering, but I have been lucky beyond all my contemporaries in the Public Works Department. . . . I have not had an hour's illness for about nine years, although I have had a good deal of exposure, and I stand heat well. I am no sportsman, and know nothing of horses, but don't mind a ride of 100 miles. I have always been used to hard work. It is no wish to better myself in a money point of view that prompts my writing to you. . . . I

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don't think you would find me above any work you thought fit to put me to." Gordon's answer was that his own stay in the Sudan was too precarious for him to invite anyone to join him, and that it was hopeless work that he was engaged on.

Sir William Willcocks, who served under him both in India and Egypt, says of him :—" Though Sir Colin was not an original engineer, he was as sound in his professional knowledge as he was full of experience. In criticizing reports, rejecting unreliable features, and grasping the really essential points of irrigation projects he was at his best. This soundness of view and grasp of his subject resulted in his being extraordinarily courageous. . . . Indeed, his whole tenure of office witnessed a succession of bold enterprises, every one of which was carried to a successful conclusion."

Sir J. H. A. Macdonald, who knew him from boyhood, says :—" He was always the same bright, unassuming, kindly man, earning respect and affection whether from those of his own race, or from the more dusky tribes among whom so much of his life was spent." In the words of Lord Milner with which the volume closes :—" He leaves a fine record of work and will be remembered as one of the best beloved of men."

E. M. Lloyd.

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(*Continued from R.E. Journal for December*, 1917).

Chapter III. is entitled *Contre-projets de Paix Allemande* (1915), and throws light on the cross currents in Germany, which, in 1915, were forming whirls and eddies in the stream of views on the subject of War aims and peace negotiations.

This chapter is subdivided into six parts, the first of which bears the title *Le Mémoire de la Nouvelle Patrie.* In it we learn that, towards the end of 1914, Count von Tepper-Laski, a retired cavalry captain, formed a society in Berlin the membership of which was open to men and women of Germany who, although professing various and different political and religious creeds, were yet united in the view that they should set themselves to work in common accord as regards the new duties imposed on the German people by the European War; duties to consist in the encouragement of every measure calculated to promote agreement between civilized peoples in matters of a political and of an economic nature. The society appropriated the title of " The League of the New Fatherland " to itself and numbered among its members men well-known in various walks of life. On the membership list appear the names of Professors Brentano, of Munich, Delbrück and Liszt, of Berlin, Schücking, of Marburg, Bruckhausen and Lammasch, of Vienna, Toennies, of Kiel, of Quidde and Wehberg, the Publicists ; of Rudolf Goldscheid,

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President of the Austrian "Monists"; of Count von Arco, the Electrical Engineer, and of many well-known Liberals. At the beginning of its career the League endeavoured to link itself up with people in foreign countries possessing sympathies similar to its own. The Swiss Pacifist, Otto Nippold, of Berne University, entered into correspondence with the League, and the British Union of Democratic Control is said to have also done so. The annexationist proposals of the Economic Associations, to which reference has been made earlier in this review, had no place in the programme of the League of the New Fatherland; indeed, this League was opposed thereto and towards the end of June, 1915, it drew up a memorandum refuting the annexationist proposals and sent a copy thereof to the Imperial Chancellor and to the members of the Reichstag. The following is a summary of the contents of the Memorandum in question:—

The Memorial of the Economic Associations contains dangerous ideas against which the League enters a protest.

1. *To aim at securing peace by the annihilation of the enemy is to proceed on a wholly wrong principle.* In history many examples are to be found of the determination with which a people resist the attempt to crush them completely out; *e.g.* Germany, a century ago, France after 1870—1871, Russia since 1904—1905, etc. Moreover, it is from the practical point of view impossible really to annihilate a nation.

2. *The Annexationist Proposals.*—These proposals involve a transfer to Germany of 12,000 square miles of territory with a population of 7½ millions in Belgium, of 8,000 square miles of territory with a population of 3½ millions in France, of 32,000 square miles of territory with a population of 5 millions in Russia, that is to say 52,000 square miles of territory in all would be added to the German Empire, and its population of 67 millions would be increased by 16 million aliens of various races; the dangers connected with the adoption of such a course are too apparent to need discussion. The suggestion to dispossess these aliens knocks the bottom out of the case for annexation. The only effect these proposals are likely to have will be the strengthening of the coalition against Germany. Moreover, Bismarck himself recognized the harm that was done by his own annexationist policy and in later times condemned the same.

3. *Annexations in the East.*—The annexations in this region cannot provide for holding the balance even between the industrial West and the agricultural East, since the West is the most densely populated and the most industrial region of Europe; moreover, Poland is fast becoming an industrial country. It is altogether untrue to assert that the Baltic Provinces desire incorporation into the German Empire—only some 200,000 out of 2¾ millions of the inhabitants of these Provinces are German.

4. *Annexations in the West.*—The economic and commercial advantages which, it is claimed, would accrue from the proposed annexation in the West form a most debatable subject. The greater part of these advantages could be obtained by Treaty and without annexation. It would be an unpardonable crime to prolong the War a single day in order to satisfy these demands.

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From the maritime and military point of view, the annexation of Belgium would only be of value for the purposes of an attack on Great Britain. The latter country will not fail to grasp the meaning and intent of such an act; in consequence Germany will only let herself in for new wars. It is useless talking of depriving France of the fortified zone from Verdun and Belfort, which is still unconquered. Even if Germany did get it, France would prepare some other strong line of defence; indeed, Germany would only be inaugurating a reign of terror throughout the universe by adopting such a course. On the other hand, small rectifications of the Franco-German frontier could be obtained by the terms of a Treaty, in which a stipulation could be inserted providing for the French frontier fortifications to be razed to the ground.

Politically, the annexation of Belgium or any part of France would only saddle Germany with the governance of hostile peoples. It is an error to suppose that Germany could, in Belgium, set the Flemish people against the Walloons; further, the inhabitants of N.E. France are noted for their patriotism. Should Germany annex Belgium she will have the whole world against her, even those who at the present time may be favourably disposed towards her.

5. *Conclusion.*—The incorporation into the German Empire of 16 millions of the enemy is an act against the interests of that Empire and its people; it will constitute an element of weakness and not of strength. Great Britain will never be a party to a Treaty of which any clauses provide for the proposed annexations, unless she is first utterly crushed. Such a Treaty, were it possible, would only keep alive the present coalition against Germany and would inevitably lead to another colossal War. The present conflict has already imposed heavy financial burdens on Germany, to prolong it for the purpose of the annexations in question only means that German soldiers are being called upon to fight in order to increase the heavy taxation already falling on the German people.

In order to satisfy the craving for power a heavy price would have to be paid, and even this price when paid would only place Germany in a position of fresh insecurity and involve her in new sacrifices. The great majority of the people, who have already suffered much by this War, are clamouring for a peace the conditions of which they will never allow to be such as to serve the petty interests of a class at the expense of those of the whole nation.

6. *The German Peace Programme.*—Herr Dernburg in an address given in the United States of America recently spoke of two principles: that of the *open door* and that of the *Liberty of the Seas*—the *open door* in order to ensure free play in the Universe to the economic forces of Germany; the *Liberty of the Seas* in order to provide Germany with communications to her Colonies and to foreign ports, in times of War as well as in times of peace—thus terminating the tyranny of Great Britain on the seas.

The League does not contest the point that the policy of the *open door* and that of the *Liberty of the Seas* should be provided for by clauses duly incorporated in the Treaty of Peace, but that International Law is bankrupt is a proposition that the League does most emphatically deny. It is hoped that the essential feature of the peace,

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which is to follow at the conclusion of the present War, will not consist alone in greater efforts being put forth for the development of International Law, but will also consist in Germany lending her aid to the attainment of this end.

Germany can and must use the territories of which she is now in possession as pawns for the purpose of safeguarding her political position and of obtaining compensation. Germany's aim should be principally directed towards the acquisition of colonies, the security of her frontiers (from a military point of view), the payment to her of a War indemnity, the surrender to her of naval ports and coaling stations.

It is wrong to speak of a premature or of a weak peace. The chief obstacle, in the two camps, to the opening of peace negotiations is that the belligerents are in each case afraid that they may be thought to be suffering from War weariness. The petitioners hope that the Imperial Chancellor will seize the first opportunity to pave the way for peace negotiations by disavowing the annexationist programme contained in the Memorial of the Economic Associations.

The second part of the third chapter is entitled *Le Mémoire des CXL. Sommités ;* in it a reference is made to the individual views of a few of the members of the League of the New Fatherland. It is suggested that all the members of this League are not in agreement with the whole of the arguments and conclusions contained in the memorandum of the League, whereof a summary has already been given earlier in the chapter; attention is particularly called to the views of Professors Brentano and Delbrück.

In the spring of 1915, two societies were founded, each with the title of the *Economic Austro-German Association*, with headquarters in Vienna and in Berlin respectively. These societies, in concert with other Leagues, carried on an active propaganda urging a Customs Union between Austria and Germany; at the end of 1915 a manifesto, signed by 800 Professors belonging to German Universities and German High Schools in Austro-Hungary, was issued by them advocating the closest union between the two Empires. Brentano supported the proposal with all his authority; not only did he favour a fusion of Austria with Germany in the interests of a vast economic development, but he further attempted to show that the act of forcibly annexing territory does not amount to conduct incompatible with the principles of democracy. His argument is as follows :—

The strength of a nation resides in the Union of the State and of its people. Every element producing discord is a source of weakness. It is for this reason that Great Britain must grant Home Rule to Ireland and that Russia must solve the Polish question by granting autonomy to Poland. But conversely, particular groups within a State are not entitled to choose their own form of Government nor to secede from the established Government. Likewise, an annexation of territory does not require the consent of the population annexed therewith to legalize it. The annexing of territory cannot be considered as an act contrary to the tenets of democracy if it be remembered that, in the political domain, the determining factor which justifies the adoption of a particular course must always be whether the greatest good to the largest number

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will result. It was without any sense of pleasure that Germany in 1870—1871 annexed Alsace-Lorraine; the Alsatians and Lorrainers, however, secured thereby the protective influence of 40 million Germans, a population twenty times as great as that of their own Provinces. The annexation of Alsace-Lorraine was therefore justified.

Again, to-day, it is necessary that Germany should annex all the territory necessary to make her frontiers safe against fresh attacks. Lithuania and the Baltic Provinces are extremely fertile regions which only await a German population and German capital to stimulate intensive production therein. Every one who has studied the question of German agriculture fully realizes the advantages likely to accrue from a union of the Baltic Provinces with the Empire and the colonization thereof by a German population.

The logic in Professor Brentano's argument may not appeal to the sense of reasoning of the ordinary Britisher, but this need not prevent the latter from fully understanding the Professor's War aims as set out above.

Professor Hans Delbrück, who teaches modern history at the Berlin University, we all know enjoys a very high reputation in his own country. He was the inventor of the phrase: "Blest be the hand that falsified the Ems despatch!" He is the Editor of the *Preussische Jahrbücher* and he made full use of his prerogative when publishing the propaganda of the *League of the New Fatherland* in his publication, by toning down the views contained in the statements issued by the League where he considered this to be necessary; he also got into touch with persons who were likely to be suspected neither of Teutonic heterodoxy nor of hostility to the Imperial Government, among them being numbered the notorious Dernburg, Dr. Paul Rohrbach, Prince Henckel von Donnersmark, Major von Parseval, Frederich von Siemens, Wilhelm Kahl and others. A memorandum was drawn up by Delbrück and his friends to which 141 signatures were appended; it was forwarded to the Imperial Chancellor on the 9th July, 1915. In this memorandum it is stated that Germany entered upon this War in order to preserve her existence and her national unity, and in order to protect her national development and not with any idea of conquests at the back of her mind. On the conclusion of peace Germany must pursue that course which will secure for her the attainment of the ends enumerated by the signatories. The memorandum continues: "Petitions have been presented to Your Excellency in which aims different to our own have been incorporated. We consider it our bounden duty to oppose those aims with all our strength and to avow openly that, in our opinion, their realization would be a most serious political error and likely to lead to serious consequences, tending fatally to weaken the German Empire rather than to strengthen it."

The signatories of the memorandum declare that they are opposed to the incorporation into the German Empire or annexation thereto of autonomous peoples and wish such schemes to be officially disavowed. According to them the German Empire, being the outcome of the idea of national unity and of national homogeneity, is able only very slowly and incompletely to assimilate foreign elements; they do not desire any

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changes to take place in the fundamental characteristics of the Empire, nor do they wish to see Germany's present character of a National State destroyed. But steps must, it is suggested, naturally be taken to ensure that the territories which will have to be vacated by Germany, according to the conditions of a Treaty of Peace, shall not become a wall of defence for her enemies, nor pass into the hands of one of her rivals. They place on record their conviction that the War will end in a complete victory for Germany and that the German people will demand, as some return for the magnificent acts of heroism, the great sacrifices and the immense sufferings of the whole nation, some recompense in proportion thereto, if indeed this were possible.

The greatest reward which Germany can obtain will consist, in their opinion, in the certainty that she need not fear even a whole world of enemies and in the proof of her great power, which constitutes an example without precedent to the present and future generations of other nations. The German people can only conclude a peace which will afford sure guarantees for their strategic needs, for the political and economic interests of their country, and for the unhampered activity of their power and their spirit of enterprise on the free seas as well as within the limits of the Fatherland. The signatories are confident that His Excellency, the Imperial Chancellor, or the Constitutional Authorities will obtain for Germany peace terms of the nature indicated in their memorandum.

Four months after the memorandum in question was forwarded to the Imperial Chancellor, Delbrück caused widespread commotion, owing to views expressed by him in an interview with an American journalist; what he had to say on this occasion was cabled from Berlin to New York and repeated thence to London and Paris. He stated that Germany hoped to obtain peace at once if President Wilson and the Pope would intervene as mediators, and that Germany's terms were practically as follows:—The cession to her of colonies such as Uganda, French and Belgian Congo as compensation for the evacuation of Belgium and the northern regions of France; an indemnity to be paid to Germany—Great Britain would have to bear this burden as the expenses to her of another year of War would exceed the price at which peace could be purchased then. He expressed the opinion that those who desired the annexation by Germany of Belgium were in the majority; naturally, the Baltic Provinces would remain in the hands of Germany, as a great part of the population thereof was German. For was it not the case that *Germany was out, in this War, to liberate the small nationalities?*

Delbrück claims to have remained faithful to the principles formulated by him at the beginning of the War regarding the peace terms to be exacted by Germany. The League of the New Fatherland was soon disavowed by its own members and came in for rough treatment at the hands of the Government. Its memorandum had been printed, but the Government seized the copies and forbade their circulation. In April, 1916, its secretary, one of the gentle sex, was put into prison, but released soon afterwards. The League of the New Fatherland has long since terminated its ephemeral career.

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The third part of the third chapter is entitled *Les Mémoires des Pacifistes* and deals with the abortive attempt of the German Pacifists to propagate their views in the Fatherland. These well-meaning people formed a " German Peace Society," which had Dr. L. Quidde, a member of the Bavarian Diet, as President, and Pastor O. Umfrid, of Stuttgart, as Vice-President. This society, at a meeting held in Stuttgart on the 17th July, 1915, decided to publish a statement on the subject of Germany's peace terms in the next issue of the *Völker-Friede*, the society's journal. The military authorities intervened so that the number referred to was the last one to appear and the journal ceased to exist. In the statement which was published in the last number of the *Völker-Friede*, it was announced that an order imposing silence on the public prevented the Pacifists from making known their views freely. They however claimed that the peace terms should be submitted *to free discussion by a free people*. Under the existing circumstances, the Pacifists, it is stated, confine themselves to the entry of a protest, in general terms, against certain annexationist proposals. They are firmly convinced that such annexations instead of strengthening Germany will weaken her. In any peace that may be concluded they wish to see the strongest possible guarantees provided to render it lasting.

From May, 1915, onwards the military authorities of Munich adopted strong measures against Quidde, threatening him with the direst penalties, at the same time forbidding him to use the telephone, to attend any public or private meeting, or even to enter another's private residence; further, he was not allowed to publish any written matter nor to speak in public. Later, Quidde, from his seat in the Diet, put questions to the Bavarian Government regarding the military censorship and the opening of all his letters. The War Minister replied, treating him with the utmost contempt. However, the German Peace Society still continued to live and was permitted to hold a Conference at Leipzig, on the 6th and 7th November, 1915, without being interfered with.

It passed a resolution, the text of which was communicated to the Press, and, on the 1st December, 1915, it forwarded a memorandum to the members of the Reichstag, and probably also to the Government. In their memorandum the Pacifists state that they realize that the time has not yet arrived for the formulation of the exact terms of peace, but they call on the Imperial Chancellor to announce that Germany does not intend to act against the interests and rights of small States, and that she is prepared to pave the way for an international understanding such as will prevent wars in the future. To them two points of military moment, which must have a decisive influence on the peace terms, stand out clearly: (i.) The first is that neither side has won that complete victory which would enable it to *dictate* the peace terms. It is no longer a question of *victory* that is in issue, but that of *supremacy*, and (ii.) the second is that this *supremacy* has, in the judgment of all reasonable human beings, been *irrevocably won* by Germany and her Allies, in spite of the fact that the enemy is Mistress of the High Seas and has cut off Germany's sea communications. On the one hand, the enemy must be made to understand that Germany will have to be

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compensated for the evacuation of the territories in the occupation of Germany's troops and those of her Allies. On the other hand, Germany and her Allies must recognize that *there can be no question of annexations by them which would touch the vital interests of their adversaries;* it is for those who may have to open peace negotiations, on Germany's behalf, to find the formula which will, without such annexations, provide the necessary guarantees for the protection of the military, political and economic interests of the Central European Powers and their Allies. The essential conditions from Germany's point of view are that her enemies shall accept the principle of the *Liberty of the Seas* and that of the *open door* so far as concerns the commerce of the Central European Powers.

The fourth part of the third chapter is entitled *Mémoire et Manifeste des Socialistes*, and in it we hear the voice of a political party which during the past three decades has been a sharp thorn in the side of the governing classes of Imperial Germany. The Socialists, at the beginning of the War, made it publicly known that they did not approve of the policy of conquests, and they made a stand against the annexationists. On the 25th June, 1915, Ebert and Scheidemann, acting respectively on behalf of the Committee of the German Social Party and the Committee of the Group representing that party in the Reichstag, addressed a petition jointly to the Imperial Chancellor, in which they entered a protest against proposals contained in the memorials of the Economic Associations and of the *Sommités*, and specially against the proposed annexation of Belgium. In this petition it is pointed out that, on the 4th August, 1914, the Social Democratic Party threw themselves in heart and soul with the cause of the German people as the existence and the independence of the nation were in jeopardy. It has played its part in the struggle against the world of Germany's enemies and it will continue to do so until such time as the safety of their country is secured and its enemies are ready to sue for peace. But they wish for a peace on terms which will permit Germany to live in love and amity with her neighbours; since it is only a peace of this kind that can provide guarantees that it will be lasting and thus best serve the interests of the German people. The rumours that attempts were being made to open up peace negotiations, it is said, brought some comfort to the hundreds of thousands who have passed through great sufferings. However, the annexationist proposals which had been divulged have already stimulated Germany's enemies to continue the struggle with unabated vigour, and can only result in the prolongation of the War. It is well-known, they tell the Imperial Chancellor, that the plans of conquest of Germany's enemies, to which publicity has been given, have only strengthened Germany's resolution to fight on.

Every assault on the independence and autonomy of a people carries with it the seeds of plants whose fruits are future wars and coalitions dangerous to Germany. After the unprecedented sacrifices Germany has been called upon to make recently, her most pressing requirement is an era of tranquillity in which she may recuperate free from all anxiety; this cannot be the case if the annexationist proposals are carried through, even if only partially. The armaments which Germany would have to

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maintain in the future would result in a great waste of Germany's economic power.

The assertion that the German Empire is in need of additional territory beyond her Eastern and her Western frontiers in order to secure her economic welfare is contradicted by the wonderful economic development that has taken place, in recent times, within the limits of the present German Empire. And so far as Belgium is concerned, Germany's trade relations were extremely close. The annexation of Belgium, the petitioners feel sure, will only isolate Germany and consolidate and augment the coalition against her. Peace should bring to Germany not more enmities, but more sympathies.

On the 26th June, the day after Ebert and Scheidemann addressed their petition to the Imperial Chancellor, the Socialists published a manifesto in their papers, pointing out that the Committee of the German Social Democratic Party and the group representing this Party in the Reichstag had always unanimously combated the policy of conquests and of annexations; they protested strongly against the efforts being made to further annexationist schemes. These efforts, it is declared, only tend to postpone the peace so ardently desired by the whole German nation. In conclusion, it is stated: "It is not annexion that the people want; it is peace that they wish for."

The publication of this manifesto gave rise to polemics and ended in the suspension by the Government of the *Vorwärts*. However, the Socialist Party adhered to its original policy; it passed a resolution on the 16th August and drew up a statement containing its views on the 21st December, 1915. This led to a schism in the party. The Deputy Bernstein was the first to throw light on the attitude of the "minority" seceding from the Socialist party. He stated that French Socialists had, in times past, formulated the claim that the population of Alsace-Lorraine should be put in a position to decide their own fate. German Social Democrats, continues Bernstein, would, by resisting this French claim that nations may dispose of themselves, bring disrepute on their conception of democratic right.

The fifth part of the third chapter is entitled *Annexionistes et Expansionistes*, and in it we learn that those whose War aims consist in schemes of territorial aggrandisement are divided into two camps. It is stated that, at the time of writing, it was extremely difficult to follow the currents of public opinion in Germany, but that to all appearances the annexationists, with the semi-official support of the Government, had gained the upper hand. It is the divergence of views on the subject of the annexation of Belgium, and of other acquisitions in the West, that has brought two camps into existence. Some of those who take up an ill-defined attitude of opposition to the annexations in the West are not averse to the incorporation of the Baltic Provinces into the German Empire, nor to Colonial expansion, nor even to the creation of a "Central European Empire" stretching far out into Mesopotamia; indeed, the War aims of this camp would increase the territories under German sway to a far greater extent than would be the case if the proposals of the "annexationists" alone bore fruit. The opponents of the *annexationists* have been dubbed *expansionists*.

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Both annexationists and expansionists demand a rectification of the Franco-German frontier for strategical reasons; they harp on the now threadbare argument that it is necessary to secure Germany against *fresh attacks*. The language they use is vague but, in order to prove their case to their own satisfaction and to that of their compatriots, expansionists and annexationists at all times give prominence to *Germany's interests*, to *Germany's power*, to *Germany's future;* a few occasionally make a brief allusion to the superior claims of Liberty and to the respect due to the rights of other nations.

Briefly, *annexation*, as the term is understood in Germany, implies the incorporation into the German Empire of Belgium, the dismemberment and crushing out of France, the assimilation of Austria-Hungary, and the acquisition of parts of Russia; whereas *expansion* represents the policy which has for its aims aggrandisement of the German Empire on an indefinite scale in the East, by the assimilation of Austria-Hungary, by annexations in Russia, by developments in the Balkans, by the forming of an alliance with Islam and by various other territorial acquisitions; in either case Germany assumes the sceptre as Supreme Sovereign of the Universe. Evidently there is little to choose between the *annexationists* and the *expansionists;* both are **Pan-German.**

In a sense, the *expansionists* belong to that class in Germany which think most of the future and who at least have given the greatest play to their imagination; they have considered matters from a worldly point of view; they wish, by clever handling of the situation, to humour the susceptibilities of the *conquered* and of neutrals, in order to pave the way towards the re-establishment of cordial relations in the future. The *annexationists*, on the other hand, are of the earth earthy, and their horizon does not extend beyond the limits of Europe; they have concentrated their attention on the tracing of new frontiers on the two sides of the German Empire, in order to provide outworks to the existing ramparts.

In Bismarck's time the subject of a big or a little Germany, with or without Austria, was much on the *tapis*. By the expulsion of Austria, Bismarck adopted the policy of a little Germany. Annexationists and expansionists both claim that they are acting up to Bismarck's principles. They also claim to be disciples of the great Corsican; "History has made us the testamentary executors of Napoleon" was the announcement made at the beginning of the War by Professor Kuhn. The Consulate was expansionist, the Empire annexationist. Prussia grew into Germany by the annexations, beginning with those of the Great Elector, but it established its hegemony in Germany by expansion, thanks principally to the *Zollverein*. Bismarck, being a Prussian, was an annexationist, but, in 1866, he spared Austria, no doubt for some sound reason; in 1871, however, his hands were forced with regard to Alsace-Lorraine by the military party.

Expansionists and annexationists have maintained a discreet silence regarding their attitude towards Great Britain; evidently they have little expectation that Albion will be knocked out by a direct blow during the course of the present War. Of course, the proposals for the annexation of Belgium are indirectly aimed at Great Britain. Germany has

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a long way to travel before she can accomplish the task imposed on her by Haeckel for the destruction of the British Empire. The German schemes of 1915 are less vast than German dreams of 1914; finally, when the time arrives for the score, which is being chalked up day by day on the big blackboard, to be paid it is more likely that it will fall to the lot of the Central European Powers and their Allies to foot the bill and not to that of the Western Powers and their Allies.

The sixth part of the third chapter is entitled *Déclarations Gourvernementales*, and in it we learn of the obstinacy with which officialdom in Germany has maintained secrecy concerning the War aims of the Imperial Authorities. In Germany public opinion is formed by order, but in spite of the memorials presented to the Imperial Chancellor calling for a lead from the Government on the subject of Germany's precise War aims the Kaiser's Universal Adviser has maintained the strictest reticence, although he has on several occasions made allusions to the War in his speeches in the Reichstag. On the 28th May, 1915, he spoke in a vague way of the guarantees that Germany would demand in order that her enemies might never again dare either severally or jointly to measure their sword with hers, and prophesied that the indissoluble union of the German races made it certain that Germany and her Allies must eventually triumph over a world full of enemies.

On the 19th August, 1915, the Chancellor stated that he would not emulate the hypocritical promises of Germany's enemies. He went on to express the hope that the occupation of the eastern frontier of Poland by German troops would give rise to a new era of progress in that country, and that thus would be wiped away the old rivalries between Germany and Poland; he further hoped that the latter country, delivered from the Russian yoke, was about to enter on a future offering great prospects of prosperity and of liberty, and one in which she would be able to fulfill her aspirations regarding a national life. Germany had set herself the task of governing the occupied territories in a manner that would secure for her the support of the indigenous population, that would result in smoothing out difficulties inseparable from War, that would provide a balm to the wounds made by Russia. If Europe wished again to enjoy days of peace, her hopes in the matter could alone be realized by making Germany strong and firm. The British policy of the "balance of power" must disappear. Germany must enforce the *Liberty of the Seas* not only for her own benefit but also for the protection and safety of all peoples; not for the purpose of exercising a tyrannical domination, as Great Britain has done, but in order that the deep waters may be freely and equally accessible to all nations. It is not Germany that is a menace to small States; indeed she is and intends to remain the strong bulwark of peace, of liberty to the weak as to the strong. Germany has at no time sought to dominate Europe. Her ambition has only been to acquire the first place in the peaceful competition between nations. The Chancellor concluded his speech by stating that it was the intention of Germany to fight on until the true culprits were reduced to that frame of mind which would induce them to live at peace with other nations, until the ground had been levelled on which to lay the foundations of a New Europe, freed from the intrigues

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of France, the megalomania of Russia and the tutelage of Great Britain.

On the 9th December, 1915, the Chancellor again rose in his place; on this occasion he informed his audience that he had in his previous speeches given an outline of Germany's War aims and he could not on that day enter into the details. It was impossible for him to state what guarantees the Imperial Government was likely to demand for example on the question of Belgium. But Germany's enemies must be sure of one thing: the longer and the more obstinately they continued the War, the more exacting would Germany be in the matter of guarantees. Neither in the East nor in the West would Germany permit her present enemies to establish conditions enabling them to renew their attacks on her. "It is," said the Chancellor, "well known that the loans to Russia authorized by France are raised expressly for the purpose of remodelling the fortresses of Poland and for the construction of railways for use against us. It is also known that Great Britain and France look on Belgium as a frontier region from which an attack can be launched against Germany. We, on our side, must adopt measures to make it equally possible to secure a triple development, that is to say, political, military, and economic." In closing his speech the Chancellor stated that "the conflict has remained, so far as the German Government is concerned, what it was on the first day, and what it has not ceased to be in all our manifestations; a defensive War on the part of the German people."

Chapter IV. is entitled *Discussions sur les Buts de la Guerre* (1916); it is subdivided into eight parts. The first part is entitled *Nouvelles Déclarations Gouvernementales* and in it we get some idea of the effect produced in Germany by the prolongation of the War. The British check in Mesopotamia (April, 1916) and the disaster to Roumania (September to November, 1916) were largely compensated for by the Russian advance in Armenia and the striking offensive carried out by Brousilof (June to August, 1916), by the Italian successes and above all by the fighting at Verdun and on the Somme. The German people were, however, not prepared to admit that victory was further from them; they were holding out, but they had become nervous; they had begun to quarrel between themselves; the schism in the ranks of the Socialists had accentuated itself; the Chancellor was attacked publicly; an epilogue was pronounced on his sibylline utterances; it was claimed and it was also denied that he had had annexations in mind when he only spoke of *guarantees* and repudiated *sentimentality*; the Chancellor seemed at times to have entirely lost the confidence of those whose opinions had value; the Kaiser kept his own counsel with the strictest reserve, and the discussions on War aims degenerated often into polemics fit only for home consumption.

The meanwhile, the Imperial Chancellor maintained his normal attitude of reticence regarding the official War aims of the Government. Once only, on the 5th April, 1916, did he enter into any explanations; an occasion on which he indulged in a bitter attack on the War aims of the Western Allies, aims which he deliberately misrepresented. In certain quarters the views that the Chancellor had expressed were held to be covered by the formula: *Guarantees in the West, annexations in*

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the East. Later, on the 5th June, the Chancellor produced the theory of the "War map" as a basis of determining the conditions on which peace must be negotiated, but he continued to harp on the theme that Germany must be protected against every possibility of attack in the future.

The second part of the fourth chapter is entitled *Éclaircissements et Commentaires* and deals with the attempts made to throw light on the real meaning of the Chancellor's official utterances.

The Imperial Chancellor is but a glorified clerk to the Kaiser; a constitutional fiction allows him to be criticized, whereas the Kaiser's name must not be dragged into debates. By a Prussian tradition the Right constitute the free lances of politics in the German Legislature, rather than do the Left. To the former party, the Government seemed to have adopted too weak an attitude both in relation to peace terms and the conduct of the War; in consequence they attacked it and with some virulence. The attacks on the Chancellor had their origin in the supposed weakness shown, but were no doubt persisted in owing to the reticence of the Government. The latter party, on the other hand, continued to examine and to explain, though not with one accord. For instance Professor Quidde, the President of the "German Peace Society," who, as we have seen earlier, was considered a dangerous person by the authorities, addressed an open letter to Professor Ruyssen of the French Peace Society containing comments on the Imperial Chancellor's statements.

In reading this letter one obtains the impression that Quidde is a most amiable and benevolently-minded German; but Ruyssen, in his reply, states with fairness that as does the Imperial Chancellor so also does the German pacifist take, whether he avows it or not, the "War map" as a basis for his peace terms. Ruyssen further points out that two forces dominate Quidde's argument: "Reasons of State and the *fait accompli*," so that "in spite of his liberalism and of the undeniable openness of his mind, he is after all a good German."

As an example of the line taken by another commentator on the Chancellor's speeches an extract is quoted from an article entitled "Freie Meere" (the Free Seas) by Professor Gerhart von Schulze-Gaevernitz, of Friburg University. In the article in question the learned Professor declares that "Germany is fighting to secure the *Liberty of the Seas*, and consequently for humanity. Aye! even for France. Germany does not aspire, on her own behalf, to a naval preponderance which she would not have the strength to maintain, but she seeks to create an equilibrium between the several naval Powers, an equilibrium in which she will be equal in rights and in strength to the strongest Power." It is by this means that Germany hopes to secure the existence of the future generations of her people. Further, Germany declares herself opposed to that state of affairs which permits a single Power to monopolize, at her sweet will, colonies whose products are prime necessities to the world at large, and to distribute the same according to her caprice among her favourites and to the detriment of others. Colonies are by no means a luxury, rather are they a vital asset to industrial States and to the society of old Europe, whose superficial area

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is limited. Germany, being an industrial State, claims for herself territories sufficient in extent and not too far removed from her geographically. Belgian Congo fulfills the twofold conditions, without seriously conflicting with the Colonial interests either of France or of Great Britain. From the economic point of view, Antwerp must remain in German hands. This port is the true and only German harbour in the North Sea. There is not and there can never be any question of its ever being returned to Belgium.

The third part of the fourth chapter is entitled *Considérations sur la "Principale Ennemie";* in it we learn how difficult a problem the Germans have found it to discover which country is their chief enemy: Great Britain or Russia. Some there are that denounce Great Britain; to them Russia's form of government, alone like that of Prussia of all others in Europe, represents the true principles of authority. The Germanophil party has not lost all influence in Russia; a separate peace with that country is within the range of possibilities. This affords a good reason for not proceeding too far against Russia; but at the same time Poland must be granted autonomy. Such at all events are the views of Professor Otto Hoetzsch, of Berlin University, the Conservative publicist.

Rohrbach, on the other hand, has repeatedly called attention, in numerous articles and brochures, to the Russian Peril, the despotism of Czarism, and the dangers to *Kultur* arising from the continuous growth of the population of Russia. Having satisfied himself that Germany cannot now hope for complete victory on both fronts, Rohrbach recommends that an attempt should be made to arrive at an understanding with Great Britain, whilst Germany's greatest effort should be developed against Russia. Delbrück, whose views coincide largely with those of Rohrbach, in a striking article entitled *Divide* (*Tag* of the 21st July, 1916), which has caused great discussion in Germany, points out the manner in which the Fatherland could secure peace by adopting the course suggested by Rohrbach.

Delbrück, in his article, expresses the opinion that "the general situation shows that it would be more advantageous to seek compensation in the East. In order to win over Russia, Germany would be obliged to renounce her schemes against Poland and Courland and to sacrifice Turkey also; these two eventualities may not be considered as within the range of practical politics." He proceeds to argue that strictly speaking Germany should seek her greatest compensations in the West; but the complete subjugation of the hostile populations in this region would require the use of exceedingly large numbers of troops and she would have to borrow Russian police methods to effect her purpose. The adoption of the latter course might bring Europe to ruin or at least lead to a series of unfortunate incidents without end. For this reason, says Delbrück, it will be wiser for Germany to adopt the very opposite policy and to drift into agreement with her Western adversaries. A reconciliation with France may not be possible; for even if Alsace-Lorraine were to be handed back to France there is no saying but that the Chauvinistic elements in that country might not also demand the whole of the left bank of the Rhine. However, if the

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former frontier of France were to be restored, Germany need apprehend no serious danger from her Western neighbour, who will have been too exhausted by the War to be able to do her harm.

Great Britain will, of course, demand the evacuation of Belgium. By evacuating this country Germany would certainly lose a geographical position of very considerable value from a military and naval point of view. The invention of the submersible has, as the experience of the present War shows, completely altered the situation and it is the submarine that will guarantee the *Liberty of the Seas*, whatever may be the terms of the Treaty of Peace. He concludes: "Let us say so openly and squarely; the truly effective guarantee, for which so much search has been made, is the submarine."

The fourth part of the fourth chapter is entitled *Déclaration de la Ligue de la Hanse* and in it we are put in possession of the collective views of the Hansa Bund, a powerful society the membership of which is composed of men prominent in finance, commerce and the law. At the time that the original article was written Dr. Jacob Riesser, of Berlin University, was the President of the Hansa Bund. It had been a subject of remark that the Hansa Bund had abstained from participating in the memorial presented by the six great Commercial Associations or Leagues in 1915, to which reference is made in the first part of the second chapter of the volume under review, but, in August, 1916, the Bund deemed the time propitious to deliver itself. The fact that Riesser and those who were associated with him were, in the period prior to 1914, advocates of War cannot fail to add weight to the views expressed in the manifesto of the Bund. In the document prepared by this body it is stated that its Executive Committee had considered the subject of War aims at a meeting held on the 15th September, 1915, but did not make the resolutions adopted on that occasion public; the War being still in progress, it was decided to exclude from the resolutions in question all reference to War aims except one in very general terms.

The Bund, whilst expressing the conviction that Germany does not lay claim to the exclusive domination over land and sea at the conclusion of the world War, nevertheless insists that the principal aim of their country must be to secure the Liberty of the Seas, in her own interests as also in that of all other States. This places its aims in accord with those of the majority of the German people who, it is stated, unanimously approve of the policy of territorial expansion. It demands the restitution to Germany of the Colonial Empire which has been lost to it during the War, the payment of a suitable War indemnity and also of compensation in satisfaction of all the other claims in respect of violations of International Law committed to the detriment of the interests of Germans settled in foreign lands.

The Bund expresses the hope that an agreement may be arrived at as to the manner in which Germany may be strengthened and her territories and power augmented, objects the attainment of which has been at all times recognized throughout the Empire as of paramount importance. It desires that all differences on the subject may be composed and that the unification of the various points of view may be brought about on the lines indicated in the Bund's manifesto.

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The fifth part of the fourth chapter is entitled *Le Manifeste des Sept Professeurs Berlinois* and gives us the views of seven illustrious Professors of Berlin University, who represent, so to speak, the patriotic Intransigentes of Germany. The names of the Professors concerned are Adolf Wagner, an economist; Otto von Gierke, a jurist; Dietrich Schaefer, a historian (*vide* notes on Chap. I., Part IV.); Ulrich von Wilamowitz-Moellendorf, a philologist; Wilhelm Karl, a jurist; Eduard Meyer, a historian, and finally Reinhold Seeberg, a theologian. Fuller particulars concerning these persons are given in the volume under review. The following is a brief summary of their manifesto: The second year of the War has been even richer than the first in German successes. The question of a coming peace is occupying the attention of the people in all quarters of Germany. Germans have ever been a peacefully-minded nation. That the German Empire should have been built up by the sword is a fate which the necessity of history has imposed upon the nation. Once created the German Empire has wished for peace alone and the necessary space for the pursuit of honourable occupations which could only prosper whilst conditions of peace prevailed. This was denied it. Thirst for vengeance, greed for conquest, the industrial jealousy of her neighbours have compelled Germany to resort to war in order to save herself and the neighbouring Empire of her Ally from mutilation and dismemberment. Germany is now fighting for an honourable peace; she did not enter upon the struggle with thoughts of conquest in her mind. Having drawn her sword, Germany cannot return it to its sheath until she can be assured of a peace, the terms of which her enemies must be compelled to observe. Such a peace renders an increase in Germany's power and an extension of her territories essential and imperative. Guarantees to this end are required and Germany's enemies having refused to provide the same, she cannot discuss peace terms.

The sixth part of the fourth chapter is entitled *Le Comité National Allemand pour une Paix Honorable* and deals with the propaganda of the Committee founded in July, 1916, for the purpose of securing an honourable peace. In an appeal sent out on the 19th July, 1916, the Committee stated that its object was to bring together patriotic Germans of every party with the intention of pursuing a policy the aim of which would be to secure a peace consisting, so to speak, of the mean of the aims of the two extreme groups—the peace-at-any-price party and the Pan-Germans.

Among those whose support was obtained by the Committee were Karl von Wedel, a former German Ambassador at the Courts of Vienna and of Rome; Thyssen, the metallurgist; Heinecken, of the Norddeutscher Lloyd Company, and others drawn from the professional, commercial, and official classes. Being a third party between two extremes, it was attacked from the left and the right. It was said that the Committee was really acting under the promptings of the Imperial Chancellor, who had confided to it the mission of announcing semi-officially the programme which the Government had hitherto refused to publish. An announcement was issued by the Committee that conferences would be held simultaneously in 80 towns on the 1st August, 1916, the anniversary day of the declaration of the War. However

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by degrees the number of the towns in which meetings were to be held was reduced to 38. In Berlin, von Harnack was the speaker. The celebrated manifesto of the XCIII. German intellectuals published in 1914 was said to have been drawn up by him. He opened his speech by stating that the reason that the Germans were sure as to the future was because they had confidence in the Almighty, in their Army and in their Government. He then proceeded to speak of War aims.

He pointed out that it was idle and dangerous, whilst a War was still in progress, definitely to lay down peace terms. But an intelligent people could not fight without some knowledge of the end in view, so that a general indication regarding the same was necessary to create the appropriate stimulus. There were some who held the view that Germany's enemies had fallen on her to crush her, and that it would be enough if she were victoriously to repel the attacks. Others, on the other hand, were of opinion that prior to the War Germany was being hemmed in and strangled; these urged that she should tenaciously hold on to all she had got into her grasp from the Somme to the Beresina and that peace should only be concluded on conditions which would automatically and permanently guarantee to Germany protection and liberty on the seas and on land. Von Harnack opines that there is much that is right and much that is wrong in these two theses. "We are surrounded," he says, "by a world of enemies and the fact alone that we have beaten them constitutes a factor of historical importance." A War such as the present one cannot end on the basis of the *statu quo ante*, but Germany can and must proceed onwards towards the ends she has had in view.

He reminded his audience that Germany had almost completely lost all her Colonies and she must in consequence reconstitute her Colonial Empire; the stronger position which she had acquired in Central Europe could not be considered as an equivalent set-off. It was not to be expected that the Colonies would return to Germany automatically, she must agree to make sacrifices in Europe to get them back.

In the second place, Germany could not negotiate a peace singly; her Allies, Austria-Hungary, Bulgaria and Turkey must also be consulted.

In the third place, most important of all, Germany must have a peace which will protect her against acts of aggression such as she has had to suffer recently. Such a peace must provide that, in the East, Germany's enemy will be definitely pushed back to the latter's natural frontier line. Russia has a mission in the East and she must again awaken her interest therein. Neither her genius, nor her methods, nor her civilization entitle Russia to a place in Western Europe; she is but a disturbing influence there. In the West, peace must provide a guarantee that Great Britain does not remain sole mistress of the seas and that Belgium does not remain her satrapy. This War is so terrible, it places the civilization and even the history of the world so near perdition that it is only by completely upsetting the present order of things that one can hope to obtain permanent benefits. The audience were finally exhorted not to lose sight of the fact that their highest War aim should be: "A Germany powerful in all free and noble undertakings, and

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living by her side and with her peacefully-minded peoples! *Regnum Dei in terris!* The Kingdom of God on earth!"

It is said that von Harnack's Germanic homily did not meet with much success. Other speakers do not appear to have been any more fortunate. The meetings announced to take place at Königsberg and Stettin had to be abandoned; Naumann, the apostle of the "Mitteleuropa" creed, and Rohrbach discoursed at Leipzig and Dortmund respectively and proclaimed the views which have given them notoriety; at Stuttgart, Professor Franz von Liszt, of Berlin University, held forth on the internal reforms which the Government should set its hand to; at Munich, Professor Marks carefully avoided the raising of a direct issue, but urged his audience to have confidence in the Government; at Dresden, Kahl was for a War *à outrance*, particularly so far as Great Britain might be concerned; at Bonn, Professor Hashagen was so carried away by the violence of his feelings as temporarily to lose his mental balance.

The total result was that the Conservatives scored a success. The *Deutsche Tageszeitung*, the mouthpiece of the Agricultural League and of Count Reventlow, rejoiced in informing its readers that the reception with which the Peace Party had met in the West proved that the German people were not in favour of a sentimental policy. The Committee of this Peace Party stopped for a time its propaganda work. However, its work had not been entirely without result. Many former members of the League of the New Fatherland associated themselves with certain prominent Liberals for the purpose of forming a new group. Among those who took part in this new movement were Walther Schücking, a jurist of Marburg, Friedrich Wilhelm Foerster, the pedagogue of Munich, the pacifists Quidde and Umfrid, the socialist Edward Bernstein, the suffragettes Minna Cauer and Helen Stöker, Capt. Kurt von Tepper-Laski. A new Committee was formed and it issued a memorandum pointing out that it had come into existence for the purpose of securing a lasting peace. This Committee labelled itself the "Central Committee for promoting International Law"; its War aims were, in many respects, similar to those of the other groups set out in earlier parts of the volume under review, but, in addition, this Committee advocated "that the peace terms should provide for the constitution of effective institutions for the purpose of procuring a peaceful solution of future international conflicts by friendly discussion and juridical decisions, in order that the old policy of armaments, which constitutes a danger to peace, may be entirely done away with." Such a peace the Committee think would alone be a *German peace in the best sense of the word.*

The seventh part of the fourth chapter is entitled *Le Comité Indépendant pour une Paix Allemande*, and deals with the activities of the Committee founded by Professor Schaefer, the annexationist. This Committee received very considerable support in Germany, its membership growing very rapidly. As the authorities had forbidden a public discussion of War aims, Schaefer decided to circumvent them.

On the 15th March, 1916, in collaboration with Paul Fuhrmann, the agent general of the German National Liberal Party, he distributed

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broadcast a long petition, whereof 700,000 copies were printed, in which he stated that, in order to obtain a " German Peace," Germany should not hesitate to prosecute a submarine War *à outrance* against Great Britain. The Government had the copies of this petition seized, and when interpellated in the Reichstag, excused the action taken by stating that the document was an inflammatory production and did not possess the attributes of a petition. The incident caused a great commotion in Germany.

When the " National Committee " promoted to secure an " honourable peace " (Chapter IV., Part VI.) organized its great demonstration in July and August, 1916, the " Independent Committee " made up its mind to have a counter-demonstration which should be striking in effect. The latter body were by no means for the Government; at its meetings violent attacks were made on the Imperial Chancellor, and it backed von Tirpitz against him. The Independent Committee sought rather to bring pressure to bear on the Government than to break absolutely with it; its membership consisted of Government officials, National Liberals and Conservatives. It had also the support of the Centre and of the military party. When one military authority put obstacles in the way of the meetings arranged for by the " National Committee," another military authority expressly sanctioned the publication of the big manifesto of the Independent Committee which appeared in the *Deutsche Tageszeitung* for the 24th August, 1916. More than 300 signatures were appended to the manifesto in question, which may be regarded as the opinion of the *élite* of the German nation. Among the signatures appear those of Schaefer, von Liszt, Schiemann, Haeckel, Wundt, von Gruber, Hillebrandt, Count L. von Kalckreuth, Count zu Reventlow, Horst Kohl, the Princes Rudolph von Lippe and Charles von Loewenstein-Freudenberg, Baron von Maltzahn, and many retired admirals and generals. The manifesto of the " Independent Committee " made its appearance then as a continuation of the memorials of the annexationists of 1915; it had its origin in the same surroundings, it bore the impress of the same minds!

But the manifesto does not breathe the haughty *intransigeant* spirit of the previous composition of the same signatories; its tone is different. Its pretensions concerning territorial conquests are not so barefaced. The " Independent Committee " would appear to have attempted to tone down the claims in the memorials of 1915 and to have outlined a mean course between these claims and the statements of the Government.

The manifesto opens with a reference to the victories of the German Army resulting in the conquest of three kingdoms. It continues: In spite of this, however, Germany's enemies are not willing to make peace, they wish to crush her utterly; their responsible statesmen repeat, without blushing, the same abominable lies, they utter the same vile calumnies to which they have given voice since the first days of the War. Germany's enemies are trampling on all the rights of the peoples of the world. In a most brutal manner, they are compelling neutrals to dance to their tune. They are working, day in and day out, to oust Germany from all fields of international commerce. They are seeking to starve out members of a whole nation, in order to compel them to lay

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down their arms, an end they have not been able to attain by their sword. But Germany's enemies have been baffled in this game. The spirit of sacrifice of the German people and their instinct for organization have caused the weapons used to crumple up in their enemy's hands. Prepared for every sacrifice, armed to put up a strong resistance and firm in their determination to conquer, Germany will let her enemies repeat their savage attacks; but these attacks will all be beaten off. Germany has at last learnt that her real and most dangerous enemy is Great Britain; it is she that is holding the Fatherland's adversaries together and that is the moving spirit among them. Great Britain hopes to plant the banner of Anglo-Saxon domination over the world on the ruins of the German Empire.

Whilst Russia is sacrificing huge armies, whilst France, with its small population, is being bled white, Great Britain continues to put new hope into the exhausted nations. Remember that England is the enemy.

The ever-increasing population of Russia will one day be a serious menace to the Fatherland; that is the reason why Germany desires to remove from Russian domination the regions situated between the Baltic Sea and the Volhynian Marshes. Placed under the influence of Germany these regions would afford the necessary military protection on her Eastern frontier.

The spirit of revenge of the French people must also be reckoned with. To meet this Germany must increase her power in the West at the expense of France.

Germany's national strength will provide the guarantees which the German people require as far as their principal enemy, Great Britain, is concerned; Albion's jealousy will not be able to prevent Germany's peaceful development. Belgium can only be a German bastion and not a British one; on this matter Germany will demand solid guarantees. "Militarily, economically, politically, Belgium must come under the control of Germany."

It is thus that Germany will obtain what is due to her in the world. It is thus that she will secure the Liberty of the Seas. It is thus that she will secure a Colonial Empire.

The design of Great Britain is manifestly to isolate Germany politically and economically; Great Britain threatens the latter's life as a nation and a State, her culture, her economic power. It is for this reason that Germany is putting forth her strength to compel her enemies to sue for peace. She is fighting so as to have an open field for her commerce, so as to secure the development of her industries, in order thus to ameliorate the lot of the German workman. The British are saying that Germany may win battles, but Great Britain will win the War; but these are but the words of idle dreamers. People of Germany, be strong! It is for your existence and your future that you are fighting. Hindenburg has indicated to you your duty: "It is not a question of holding out to the bitter end, but of conquering."

The eighth part of the fourth chapter is entitled *Outranciers et avisés* and deals with the later developments in the two currents of opinion which have always existed in Germany on the subject of territorial

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acquisitions. In 1916, the annexationists and expansionists of 1915 became respectively the *outranciers* (or whole hoggers) and the *avisés* (or wiseacres).

The *outranciers* consist of those who see in Great Britain Germany's principal enemy. They dream of a separate peace with Russia, whose rivalries will later be so valuable in keeping Great Britain in her place; such a peace cannot naturally be obtained without some *quid pro quo*. They wish for annexations and territorial aggrandisement in the East as well as in the West, for the dismemberment of Belgium, for the creation of a Germano-Flemish State. They possess the instinct for conquest. They discount a complete victory and the complete exploitation of victory; but not a premature peace. In their opinion, Germany is capable of holding her own single handed during the War and she must be able to do so also when peace reigns. She will be the stronger the more exclusive she becomes. A state of War is but protection in its most extreme form. All is fair in love and in War. To crush Great Britain, submarine warfare must be pushed to extremes. Doubtless this will cause others to suffer and to protest; maybe even to enter the lists against Germany. But Germany does not fear even a world full of enemies. She is strong. What is essential is that the *patriotische Einheit*, the holy unanimity of the first days of the War, the "ideas of 1914" shall continue to prevail. Therefore internal reforms must be postponed.

Such were the arguments of the Conservatives, of the majority of the National Liberals and Progressists, of the Catholic Centre, of the Prussian squires, of the Agrarians, of the protectionists, of the landowners and peasants, of the majority of the professors and intellectuals, of the middle classes, of the civil servants, of Government contractors, of the proletariat and lastly of the military party, a veritable dictatorship so far as the civil population was concerned.

The *avisés* consist of those who feel that Germany will never be able to get the better of Great Britain; moreover it would be useless if she did so. Consequently, it will be more to Germany's advantage to seek the price of her victory at the expense of Russia. The *avisés* would be content with guarantees in the West, but they demand territorial acquisitions in the East, either directly by annexation or indirectly by the creation of Vassal States. They repudiate the idea of conquest. They speak of nationalities. They are concerned with the reactions likely to be produced by German policy and with Germany's future in consequence. They do not look forward with equanimity to the prospect of the break with neutrals which is likely to be produced by submarine warfare *à outrance*. They only demand the Liberty of the Seas and open ports. Their conception of German hegemony is more subtle and more insinuating than that of the *outranciers*. Germany ought to have the most extensive access to every part of the two hemispheres. They recognize that the longer the War lasts, the more difficult will it be for Germany to re-establish economic relations with her former customers. The earlier the peace, the more profitable will it be to Germany. They feel that internal reforms leading to a democratization of the Empire are necessary.

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Such is the angle of view of certain classes of Conservative Imperialists, of National Liberals and Progressists, of the Socialists, of the financiers, of captains of commerce, of ship owners, of some intellectuals and professors, and of a part of the middle and of the labouring classes.

The cleavage between *avisés* and *outranciers* is less a matter of party politics and social standing than that of temperament and personal inclinations. In the ranks both of *avisés* and of *outranciers* alike are to be found not only Germans, but also Pan-Germans. However, in spite of the fact that the War aims of the *avisés* appear extremely moderate in comparison with those of the *outranciers*, it is the War aims of the former that constitute the more serious menace to the Liberty of the World.

Chapter V. is entitled *Les Invites à la Paix* (1916—1917) and is subdivided into three parts. The first part is entitled *La Suggestion aux Alliés* and deals with the German peace proposal of 12th December, 1916. When the question of peace was broached, a free discussion of War aims at last became possible in Germany, so far as the censorship would admit. However, the German Government refused, more obstinately than ever, to disclose its programme. When addressing the Reichstag on the 17th February, 1917, the Imperial Chancellor stated that although much had been said and written on the subject of War aims, nevertheless he felt it would be useless, in the position which he occupied, for him to formulate promises or to lay down the exact conditions of peace. He contented himself by reiterating the statement that the peace he looked forward to was one that would be lasting and which would indemnify Germany in respect of all she had suffered, at the same time securing for her a strong position and a brilliant future.

It would seem, however, that Germany had caused her peace proposals to be conveyed secretly to the Entente Powers. Monsieur Vandervelde, the Belgian Minister, speaking about this time at the Trocadero (Paris), enumerated the peace conditions which it was understood would be imposed on Belgium. The terms indicated were confirmed in articles published in the Swiss, French and American Press. When these revelations had been made, articles, although couched in more vague terms, also appeared in the German Press laying down almost identical conditions. It may be assumed then that when Germany put out its feelers, the Kaiser's Government had a cut-and-dried programme. It was announced by the German Press that if peace pourparlers were to begin to-day the German Empire would offer to restore to France territories in the former's occupation subject to the following conditions:—(*a*) Cession to Germany of Briey and its mineral basin; (*b*) cession to Germany of a port on the English Channel, Calais or Dunkirk; (*c*) payment to Germany of a War indemnity of 600 millions sterling. As regards Belgium, the German Empire would express its readiness to provide " for the restoration of her territorial integrity and sovereignty " under the following reservations:—(*a*) Belgium will be forbidden to keep up a national Army; (*b*) Germany will have the right, in perpetuity, to provide and maintain garrisons of her own troops in the *fortresses* of Namur, Liège, and Antwerp; (*c*) a German Commission will exercise

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control over Belgian railways and ports; (*d*) a Commercial Treaty, favourable to Germany, will be negotiated between the two countries.

The Pan-German agitation now recommenced with redoubled fervour. The Government next made a capital concession to the *outranciers*; on the 2nd February, 1917, it announced its decision to undertake a submarine War *à outrance*, and risked a rupture with the United States of America and with other neutrals. The " Independent Committee " (*vide* Chap. IV., Part VII.), now on the side of the Government, organized a vast bellicose propaganda and conducted it with Chauvinistic enthusiasm. It held a great meeting in Berlin on the 19th January, 1917, when it sent a telegram to the Kaiser giving expression to sentiments of loyalty. Meetings were also held in the Provinces, when the speakers, mostly belonging to the National Liberal, Conservative and Progressist Parties, announced the War aims of their organization to be: Annexations in the East, in Courland specially, or at least a German domination over the Baltic Provinces; a political, military and economic domination by Germany over Poland, including Lithuania, and also over Belgium; the acquisition of Calais, Dunkirk, and Boulogne for the purpose of menacing Great Britain; the consolidation of the German frontier at Metz; annexation of the mineral regions of Longwy and Briey; the strategic rectification of the French frontier along the Vosges as far as the Meuse, by the annexation of Verdun, Toul, Nancy, Luneville, the Vosges and Belfort; the restoration of the German Colonies with additions thereto; free ports, the Liberty of the Seas with *points d'appui* and supply bases for the German Navy on the Great Sea routes; War indemnities, payable not only in specie, but in food and in prime necessities.

We are asked to compare the most recent programme of the notorious Pan-German League with the foregoing; the similarity between the two is striking. The Pan-German programme in question is set out below:—

(i.). Germany must annex a part of the French territory occupied by her.

(ii.). Belgium must be linked to Germany.

(iii.). Germany must have a Naval base on the English Channel, W. of the Straits of Dover.

(iv.). Germany must take over the Baltic Provinces, Lithuania, Poland and a great part of the Ukraine.

(v.). Germany must annex Belgian Congo, in order that with her former Colonies she may create a great German Colonial Empire in Central Africa.

(vi.). Germany must establish Naval bases throughout the world.

(vii.). Austria and Bulgaria will divide between them Roumania, Serbia, Montenegro, and Albania.

(viii.). Turkey will annex Egypt, the Soudan, Tripoli and its hinterland as far as the confines of the German Colonial Empire in Central Africa.

The " National Committee " now left the field open to the " Independent Committee "; the former seems to have been outmanœuvred, nevertheless it could not deny itself the privilege of putting the public in possession of its latest programme, the terms of which were as follows:—

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1. The peace shall be not only a " German peace " but also that of the German Allies, and a peace which will continue the existing alliances of Germany.

2. The decision as to what shall be done in the case of the occupied territories must be determined by military requirements and by considerations affecting German interests. Most important of all is the question of the rectification of frontiers; the phrase " policy of annexion " must not frighten the German people.

3. The Liberty of the Seas must be secured for the German people and all those who are not British, and in particular for neutrals.

4. A powerful Colonial Empire capable of self-defence must be ceded to Germany.

5. A War indemnity corresponding to the extent of Germany's sacrifices is indispensable.

Although the " National Committee " tried to keep up the pretence that its point of view was not the same as that of the " Independent Committee," it is easy to see that, after the German peace offer of 12th December, 1916, was made, the programmes of the various Committees, Leagues and Groups in Germany that were concerning themselves with peace terms were brought more or less into line with one another. The *outranciers* swept the *avisés* off the field. But silence was imposed on all dissidents; the liberally-minded and the Socialist minorities alike.

The second part of the fifth chapter is entitled *Invites à la Russie* and deals with the *volte-face* suddenly made by the German Government when it learnt of the revolution in Russia. The Imperial Chancellor, having been questioned in the Reichstag, on the 15th May, 1917, by Roesicke, the Conservative, who spoke in the name of the annexationists, and the *outranciers*, and by Scheidemann, the leader of the Socialist majority, who, in order probably to coax the Russian, alluded to the possibilities of a revolution in Germany, replied to his interrogators in the following sense :—I have been asked to state the War aims of the German Government. It would not be in the interests of the country to supply this information at the present time and I therefore must refuse to do so. Since the winter of 1914–15 I have been frequently pressed to state our War aims in detail and my silence regarding the programmes of the various parties has been construed into an approval thereof. I again enter a categoric protest against such an assumption. When the time arrives for settling Germany's War aims, I wish it to be clearly understood that the Government will not be in a position to take part in any public discussion on the subject and it will not participate therein.

I have said here, from my place in the Reichstag, all that I can say on the subject of Germany's War aims; these were given expression to in solemn form on the 12th December, 1916, when, jointly with her Allies, Germany made an offer of peace.

I quite understand that the nation should be occupying itself so earnestly with War aims and peace conditions. There can be but one line of conduct for me : *to seek a rapid and, at the same time, a successful conclusion of the War.* I can neither do nor say more than this. Neither

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Herr Scheidemann nor Herr Roesicke will turn me from this path. Neither Great Britain nor France show any inclination for peace; indeed, on the contrary, they are doing all they can to excite people weary of the War to continue it indefinitely.

As for Russia, it seems to me that New Russia has renounced all big schemes of conquest. Undoubtedly, Great Britain, aided by her Allies, will do her level best to keep Russia harnessed to her chariot of War and to thwart the wishes of the Russian people for the re-establishment of an early peace in the world. But should Russia desire to save her sons from the toils of death, to renounce all her violent schemes of destruction, to establish lasting, pacific and neighbourly relations with us, naturally we will, on our side readily fall in with her wishes, and we will not render the consummation of the end in view impossible by putting forward demands incompatible with the liberty and instincts of the Russian people, demands likely to give birth in the souls of the Russian people to seeds of a new enmity. I am of opinion that it is possible to arrive at an understanding founded exclusively on reciprocal treatment from which all ideas of violence shall be excluded.

If the foregoing statement is compared with that made by the Imperial Chancellor on the 5th April, 1916, the flagrant contradiction between the two becomes at once apparent; it is a case of a velvet glove to-day, whereas last year it was a case of claws and fangs. The Socialists, on the other hand, have been more logical; they are "realists" and only consider the interests of Germany, "idealists" though they may be in theory. Questions relating to the Baltic Provinces, Lithuania, the Ukraine, in fact all German aims in Russia have been perfidiously removed out of the way as if by a sleight of hand. By reason of the clumsiness of the camouflage, the fact reveals itself that the Socialist declaration is directed against the Powers in the West.

The Peace of the social democracy is but a "German peace," a "German peace" clothed in hypocrisy; it pretends to be seeking a solution by mutual consent, and it claims to couple with its demand for guarantees in relation to the free political, economic and cultural development of the German people a condemnation of acts tending to violate the vital interests of other nations. It accepts the principles of peace advocated by the Council of Soldiers and Workmen formed in Russia, that is to say a "peace without annexations and indemnities" and one based on the right of each country to work out its own salvation; it has passed resolutions under seven heads laying down its views on the several points connected with German War aims which have from time to time been under discussion.

The third part of the fifth chapter is entitled *Les Trois Formes de Paix Allemande* and contains a brief review of German War aims generally. It is pointed out that if the views of the Socialist minority and those of certain intellectuals and Liberals, who are a rare exception to their class, be excluded, the "German peace" proposals fall, towards the end of the third year of the Great Cataclysm, into three distinct classes or groups:—

1. The expansionism of the Socialists or the white peace. This solution involves a return to the *statu quo* and would leave Germany the

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victor, permitting her to regulate for her own benefit the organization of the future *Society of Nations*.

2. The expansionism of the *avisés*. This solution provides for obtaining the hegemony of Germany throughout the world by a system of *guarantees*, disguised annexations, strategic rectifications of frontiers, by the Germanic conception of the *Liberty of the Seas* and *open ports* and by the acquisition of a vast Colonial Empire.

3. The annexationism of the *outranciers*, which aims at obtaining results similar to those advocated by the *avisés*, but in a way that would be more striking and more brutal. This solution demands the re-drawing of the political map, the final ruin of the vanquished and the continuance of the militarist policy of domination by the sword.

The special features of the three proposals in relation to time are that the Socialist peace *must* be *immediate*, that of the *avisés* can be *quickly* obtained, that of the *outranciers* one that is *postponed*. The first displays conventional ideas, conceived almost exclusively for the benefit of Germany, the organization of the *Society of Nations* on a juridical basis ; the second accepts these ideas, but as being of secondary importance ; the third will have none of them. In all three cases the ends in view are held to be realizable by means of a *separate peace* with each belligerent (commencing with Russia), whereby the knot that binds Germany's adversaries together is to be untied. At the same time, it seems to be contemplated that Germany's present Allies may continue in a state of vassalage, even if they be not incorporated into the Mitteleuropa State, the future Greater Germany.

But the development of the Socialist formula has had the effect of pushing the expansionism of the *avisés* towards the annexationism of the *outranciers*, which has itself become, in appearance, less *intransigeant*.

The Prussianized German people have become so well disciplined that their programme of domination may be ascribed to their extreme readiness to render obedience in all things. From an outsider's point of view the " German peace " proposals, in all three forms, have a striking Pan-German likeness ; but from the point of view of those within the pale, the three forms do not consist of claims that are interchangeable, but of those that mutually exclude one another. However, even if a formula is found which, without satisfying any one of the three parties in question, may nevertheless be accepted by them all owing to War weariness and final exhaustion, even that peace would always be a " German peace." It would not be the world's peace. If, at the present time, nearly all the civilized peoples are found ranged against Germany, this situation has certainly not been brought about by any skilfulness on the part of the diplomacy of the " Entente " ; Germany owes it to herself alone. Peace cannot be nationalized in the same fashion as a " German God," nor can it be manufactured as an article—bearing marks of the country of its origin—for export only ; no peace imposed by a conquering nation on a vanquished one can be a lasting peace where all the obligations, duties and conditions are framed on a unilateral basis. The same remark applies to the peace which is a compromise between adversaries who are equal in strength, and still more so to a peace which is the product of the bastard insinuations of a

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Germanized *Internationale ;* an " honourable peace " postulates honour, and there is no reasonable being in this world who can conceive such a thing as honour without justice.

Containing as it does the recorded views on the War aims of the several German groups, the volume under review is one of the most valuable of the recent issues of the " Pages d'Histoire " series ; and Monsieur Pariset is to be congratulated on the able manner in which he has brought the available material contained therein together. That there should be some repetition in the volume is something that could hardly be avoided when one remembers to what an extent education has been standardized in Prussianized Germany ; indeed, it would, under the circumstances, have been a matter of wonderment had the patriotic litanies of the Teuton presented wide dissimilarities.

W. A. J. O'MEARA.

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NOTICE OF MAGAZINE.

REVUE MILITAIRE SUISSE.

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IMPRESSIONS FROM THE AUSTRO-HUNGARIAN FRONT.

VII. *With the Army of Transylvania.*

The Invasion of Roumania. The Wooded Carpathians.—The first article on the above subject appeared in the number of the *Revue* for August, 1916 (*vide R.E. Journal* for November, 1916). The text of the original article under notice is accompanied by reproductions of photographic views of the country in which the Austro-Hungarian Army is fighting.

In January, 1917, the Army of Transylvania, consisting of the Austro-Hungarian I. and II. Armies, was extended on a front of nearly 190 miles, from Oïtos, in Roumania, to the Tartares Pass, on the Bukovina frontier. This Army was commanded by the Archduke Joseph.

In August, 1916, when the Roumanian Army penetrated into Transylvania, it was opposed alone by the 39th and 61st Hungarian Divisions and a few Landsturm battalions. These troops retired, putting up a stubborn fight the meanwhile, on to the line Segesvar-Valley of the Maros-Szasregen in order to give time for reinforcements to be brought up; needless to say they destroyed the bridges and railways in the region vacated by them. The Roumanians advanced with great caution. At the end of September, the Austro-Germans were in a position to assume the offensive. After the Battle of Hermannstadt, the Roumanians were forced to repass the Rotenturm, and Falkenhayn pursued them into Wallachia. At the same time, further north, von Arz's Army, which was covered by a Cavalry Corps, pushed the Roumanians back in quite a short time to the line of the Upper Alt; this river line was reached on the 10th October. The Austrian 1st Cavalry Division pushed on to the Gyimes Col, on the Roumanian frontier; it entrenched itself there and awaited the arrival of the main body. By the middle of October the Roumanians had been driven back along their whole front into Moldavia.

It was at this time that the Russians made a tardy effort to succour their Allies by launching a vigorous offensive in Bukovina and in the Wooded Carpathians. The Roumanian Divisions fighting in the northern part of Moldavia were relieved by the Russians at the beginning of November; six Russian Divisions were made available for transfer to the south. But the Roumanian Army was already so played out as to be incapable of taking the offensive.

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At the end of November, Falkenhayn threatened Craiova and, on the 6th December, Bucharest fell into Austro-German hands without offering any resistance. The Roumanian retreat was now accelerated by the continuous pressure from Mackensen in the south and from the Archduke Joseph in the west. The Army of Transylvania advanced skirting the Moldavian frontier, its right wing faced N.E., and attempted to reach the Trotus, a tributary of the Sereth. In January last, it linked up with Von Gerok's Army Group, which was on Falkenhayn's left. Further north, in Bukovina, in the region of Kirlibaba and Dorna Watra, the Russians multiplied their attacks (in the depth of winter) in an extremely inhospitable mountain country, sparsely populated and ill-provided with roads. The tactical successes gained by them possessed no ultimate value and were obtained at a cost altogether disproportionate to the casualties suffered by them. Von Kovess and von Arz, both Hungarians by nationality, commanded the Austro-Hungarian Armies. The former had commanded the Army which was engaged in 1915, in the second campaign in Serbia. The latter was, on the date of the declaration of War, Chief of Section in the Ministry of War; he immediately took over command of the 15th Division and in September, 1914, was promoted to the command of the VI. Austro-Hungarian Army Corps. When the Roumanians invaded Transylvania, von Arz was given command of the recently improvised I. Army, and after the Roumanians were driven back, he became Chief of the Austro-Hungarian General Staff.

The most important points, from N. to S., of the Wooded Carpathians are: the Tartares or Jablonica Pass, which leads from the valley of the Theiss into that of the Pruth, the Capul Bluff, N. of Kirlibaba, the *point d'appui* of the Mesticanesti, near Valeputna, and the heights on the left bank of the Bistriz, which command Dorna Watra.

Three railways alone traverse this mountain chain; that from Maramaros Zsiget to Kolomea, *viâ* the Tartares Pass; that of the Gyimes Col, which leads from the Valley of the Csik into that of the Trotus; that from Dorna Watra to Kimpolung, which connects the valley of the Bistriz with that of the Moldava. A branch line, parallel to the frontier, runs between Kronstadt and the valley of the Maros. All the other lines are of minor importance and end in *culs de sac.*

Roads fit for vehicular traffic only exist in the principal valleys. Rough paths often run along the banks of the mountain streams. The forests are practically impassable; a track can only be hewn through them by the woodman's axe.

The Carpathians possess many of the characteristics of the Alps; there are but few large valleys in them and no deep ravines, but there exists a closely netted system of tortuous valleys. The highest points of the Wooded Carpathians do not exceed 7,250 ft.

The rock in these mountains is well able to withstand the battering of heavy artillery. Plenty of natural cover exists for the reserves and the artillery of the defence can play its part without being disturbed and with the minimum of casualties.

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War of Positions.

Density with which Fronts were held.—A visitor examining the front held by the Army of Transylvania in December, 1916, and January, 1917, could not fail to be struck with the great extent of front held by the small numbers employed; for example, a company was allotted to a particular section, which, according to pre-war views, ought to have had a whole regiment told off for its defence. In no case was the allotment of troops so high as one man per yard of front. The Austro-Hungarian I. Army Corps held, in January, 1917, a front of 15½ miles with 16,000 rifles; the XI. Army Corps a front of 31 miles with 20,000 rifles; the VI. Army Corps a front of 37 miles with 22,000 rifles. Many companies held a front of 1,000 yards, and in one case 100 rifles were told off to a front of 1,750 yards, and held it against renewed attacks. Four machine guns were allotted to the front held by each company.

Reserves.—Not only was the front line held with small numbers, but there was also a similar lack of density as regards numbers from front to rear. There was no general reserve, but each section of front had its local reserve; this system is practically essential in a mountain region owing to the difficulties of lateral movement.

The reserves held the second line, and sometimes a third line. During the bombardment preceding an assault, the troops holding the front-line trenches sought shelter in their dug-outs and only lined the parapets when the enemy's infantry moved forward to the assault.

As the Russians generally attacked on a very narrow front, the reserves of adjacent sections were moved to positions in rear of the section attacked ready to reinforce the troops holding the same.

Advanced Posts.—As the opposing forces were at certain parts of the front 2,000 yards apart, a regular system of advanced posts grew up in such localities. About 300 yards in advance of the section of front held by each company a certain number of observation posts were constructed for occupation by N.C.O.'s; these were connected to the Company Headquarters by telephone. In very accidented country, four such posts were provided for each company. During the night patrols moved along the front from post to post.

Listening posts were provided both in advance of and in rear of the wire entanglements; the former were occupied in the daytime, the latter at night.

In the trenches there was, during the night, always one man on watch per section.

Russian Method of Attack.

Russian troops when attacking are covered by a dense curtain of patrols whose function is to dislodge the enemy's advanced posts.

The Russian artillery preparation begins as a rule late in the afternoon. Its fire is first concentrated on the obstacles; but in January last, they appeared to be husbanding their ammunition, since they did not always sufficiently destroy the Austrian obstacles. The Russians also attempted to make gaps in the obstacles by means of hand-thrown mines.

Next follows a concentration of the artillery on the first-line trenches.

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For this purpose, the Russians employ a method of fire, known to Austrians as *Punktschiessen, i.e.*, regular and accurate fire kept up for several days against the same targets. The moral effect of such fire is said to be greater than that of *Trommelfeuer* or Drum-Fire. This bombardment continues throughout the 24 hours.

During this period the attacking infantry come up to within 500 to 600 yards from the positions which it is intended to capture, and dig themselves in.

When the infantry attack is launched the Russian artillery lifts its fire and brings it to bear against the enemy's reserves, the adjacent sectors of defence and the enemy's artillery. Field guns continue their fire against the first-line trenches until the attacking line of infantry reach the obstacles.

From this time onwards the field guns endeavour to break up the counter-attacks attempted by the enemy's reserves, in order to give their own infantry a chance of seizing the enemy's trenches and consolidating themselves therein.

The Russians advance in successive lines of skirmishers, 150 to 300 yards apart. The men of the first wave are provided with wire cutters and hand grenades, but do not carry rifles; few of them survive: succeeding waves often take forward their machine-guns; the success of these waves depends upon the state of the enemy's demoralization or his losses. The sixth to the eighth waves as a rule succeed in penetrating into the enemy's trenches.

If a Russian attack is repulsed, the artillery preparation recommences and a second assault is delivered on the day following.

Infantry attacks are delivered in the daytime; this is because of the difficult nature of the *terrain*. At night, attacks in wave formation are not possible in mountainous country.

The Russian barrage fire during an attack often involves the enemy's reserves being moved, and seriously interferes with the supply services; Austrian supply wagons, it is stated, have been hit when more than 6,000 yards behind the firing line.

The Fortifications in the Mountains.

The Austrian trenches are, in broken country, constructed in short sections and consist of a series of successive salients; sometimes, isolated closed works are constructed within supporting distance of one another. The Austrian infantry now prepare their own defences and do a great deal of work which formerly fell in the province of technical troops. However, it has been found necessary to form a *technische kompagnie* (a company of specialists) in each regiment; this company receives a special training in order to enable it to execute technical work.

An Austrian *position* generally consists of two or three parallel lines of trenches or works from 100 to 300 yards apart. All these lines of works are put in hand simultaneously; the second and third lines being constructed by the reserves.

The system of closed supporting points, abandoned in 1914 and 1915, was reintroduced in 1916. Works of this kind, with garrisons of from one to two companies, have been found very useful in mountain regions.

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It was works of this description at the Mesticanesti Tunnel, on the Dorna-Watra-Kimpolung railway, and in the Bukovina that defied the efforts of the Russians for eight months.

The design of the Austrian trenches is very similar to that until recently employed by the Germans in Northern France. In the mountain regions, in addition to the obstacles normally met with, the Austrians have added the so-called *Steinlawinen* or stone avalanche. They have also made much use of *camouflage* in connection with their defensive positions in order to deceive their enemy.

Transport.

The Austro-Hungarians have adopted, as their single standard vehicle, an ordinary peasant's cart as normally used in the country; it has given satisfaction. It is a sort of ladder cart weighing about a couple of hundredweight and drawn by two horses; it can carry a load of 4 cwt. These vehicles were at first obtained on requisition, but are now being manufactured by the State.

Dogs are also being employed for draught purposes now.

In the Carpathians an infantry battalion is provided with 120 pack animals and 12 baggage wagons. An infantry regiment is also provided with 15 vehicles reserved solely for the transport of barbed wire.

Equipment and Stores.

Winter Garments.—Before the War, the soldier's clothing was provided on the basis of summer wear only. But in order to meet the rigours of the climate in the mountain regions in which the Austro-Hungarian Army has been obliged to fight woollen under garments, double-lined capes and greatcoats, fur-lined jackets, woollen caps, warm gloves, etc., have now been issued to the men. At times there is 25 to 30 degrees of frost in the Carpathians.

The troops are all provided with travelling kitchens, and these are taken as close as possible to the front-line trenches, in order to ensure that hot meals may be served to the men holding these positions.

In the mountain regions many Telfer lines have been erected; ammunition and supplies are carried by this means to the positions at the greatest altitudes occupied by the Austro-Hungarian troops. These Telfer lines are of the simplest nature, and the actual haulage is provided for by a single horse in the case of each line.

Observations on the Russian Forces.

At the beginning of January, 1917, Brussiloff's Army consisted of the 8th and 9th Russian Armies (Kaledin's and Letchinski's).

The deficiency of officers which existed in the Russian Army in the autumn of 1915 was still more marked at the beginning of the current year. Officers were rarely found among the enemy's dead or amongst the prisoners taken by the Austro-Hungarians. The attacking troops were led by N.C.O.'s and one or two officers per regiment. The officer problem is a most difficult one in Russia as there is no leisured middle class in that country on which to draw. Casualties among Russian officers was extremely heavy at the beginning of the War, and it became necessary to commission N.C.O.'s in large numbers; they were often illiterate.

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Use of Cavalry in Trench Warfare.

The Jacobeny-Dorna Watra Sector was held by several divisions of cavalry which fought in the trenches, after having fulfilled their *rôle* in October, 1916, of independent cavalry. The regiments of these divisions, reinforced by machine-guns (12 per regiment) and Horse Artillery were reorganized so as to enable them to put as many rifles as possible into the trenches, whilst maintaining their characteristics as mounted troops and also their mobility. When the war of movement came to an end, three out of the six squadrons in each regiment (named the *Reiterabteilung*) kept their horses with them at the front, whilst the remaining three squadrons (named the *Schützenabteilung*) sent their horses into the interior of the country. The latter horses were employed on agricultural work.

The men of the *Reiterabteilung* retained their normal equipment, and were employed as cavalry from time to time. This change broke the monotony of life in the trenches. A cavalry division thus organized, was able to put 4,000 rifles into the trenches.

The men of the *Schützenabteilung* were equipped as infantry, but continued to wear the cavalry uniform.

The divisional cavalry continued to be equipped as cavalry.

It is said that the Austro-Hungarian Cavalry has come out of the ordeal through which it has passed in this War with an enhanced prestige.

To-day, very considerable attention is being paid in Austria-Hungary to the musketry training of cavalry; equitation, however, being by no means neglected. Indeed, everything which tends to develop boldness, dash and the essentials of the cavalry spirit is being fostered with sedulous care.

TRENCH ARTILLERY.

Trench artillery has acquired considerable importance, relatively, in the present War. And every day one sees the increased importance that the belligerents, on both sides, attach to the personnel detailed to man this new arm and to the auxiliary equipment for these weapons. This is particularly so in the case of the Belgian Army.

It was at the beginning of 1915 that trench artillery first made its appearance as an independent unit, with its own characteristics and its special tactics. Its evolution, at the beginning, did not proceed methodically, but as experience was gained and the requirements came to be properly understood, the development of this arm settled down into a definite channel. The French were the first to make use of trench artillery in the present War; they began by employing a few weapons of this class and a personnel of 180 men in the Artois region. The results achieved were so promising as to lead to a rapid growth in this arm. The introduction of short-range artillery was the natural sequel as soon as the infantry of the two sides took to that form of warfare which brought them within a few hundred feet of one another, each protected by earth parapets, and provided with all the accessories that the engineer's art could place at their disposal. The enemy's parapets and obstacles had to be destroyed somehow in order to give infantry attacking such defences a chance of success. Ordinary artillery placed 6,000, 8,000 or

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may be 10,000 yards from the enemy's trenches was not in a position to direct its fire with such accuracy as to avoid hitting the defence works of its own side under the conditions in question. A catastrophe of this kind had to be provided against owing to the disastrous effects likely to be produced, should the artillery cause considerable casualties to the infantry of their own side just at the time that an assault was about to be delivered by the latter. To the desire to avoid such catastrophes is it that trench artillery owes its birth.

Trench artillery, it is pointed out, possesses considerable advantages of an economic order; considerable energy is expended in propelling a projectile towards a target at long range, and a great part of this energy is uselessly spent so far as the destructive effort of the projectile is concerned. If the theoretical aspect of the economic problem be represented by the equation

$$P = M \times D,$$

where P=Explosive force of the charge,
M=Mass of the projectile,
D=Distance travelled by the projectile,

then the smaller D is made in the same proportion can P be reduced without any diminution in the destructive power of a projectile which depends on its bursting charge for the work done by it against its target, *e.g.*, if the range be reduced from 8,000 to 800 yards, the charge in the cartridge can also be reduced in the proportion of 10 to 1; this represents a saving of 90 per cent. However this saving does not represent the whole of the economy that may be effected. A reduction in the charge naturally brings about a reduction in the pressure exerted on the tube of a gun by the gases liberated on the ignition of the propellant; the pressure exerted by gases liberated by different quantities of a propellant fired in a given confined space are directly proportional to the charges exploded therein. Hence it is that with short range trench warfare weapons very considerable economies are effected in the weight of metal required in their construction; in addition many other advantages are gained, particularly in connection with the manufacturing processes as compared with those employed in the construction of ordinary field and heavy artillery.

Another advantage that trench artillery possesses in comparison with ordinary artillery is that the detachments required for manning them are smaller and no elaborate arrangement of telephonic communications, forward observation posts, etc., need be provided.

An explanation is given in the original article of the successive steps by which the present designs of trench artillery were arrived at. The first solution of the problem was attempted by reducing the initial pressure in the bore; the second, by increasing the size of the projectiles, but without making any alteration in the initial pressure.

The theoretical equation given above can be stated in either of the two following forms:—

$$M = P \div D, \text{ or } D = P \div M.$$

Consequently if P remains constant any increase in M will involve a proportionate decrease in D, *e.g.*, if with a certain charge a 9-lb. shell

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can be propelled 10,000 yards by a gun, with the same charge a 90-lb. shell can be thrown 1,000 yards by the same weapon.

In following up the second of the lines of attack referred to above many difficulties of a technical nature were met with, but were successively overcome. It is undesirable at the present juncture to give detailed particulars of the latest types of trench armament. All that can be said is that very considerable progress has been made and some very powerful types of short-range artillery has been designed and put into the hands of the troops.

Notes and News.

Switzerland.—Colonel Wildbolz has published a striking article on the training of the soldier in the number of the *Allg. Schw. Militärzeitung* for 30th June last; this article has caused quite a stir in Swiss military circles. Put shortly, he is of opinion that the Swiss soldier is made to do so much purposeless drill as to make him positively fed up with military service, whilst at the same time this part of his training is carried out in a manner which loses sight of the true functions of a soldier and results in a rigid formalism which is altogether incapable of turning men into efficient combatants.

In commenting on the article in question the author of the original notes in the *Revue* calls attention to a maxim which is now many centuries old: *La lettre tue et l'esprit vivifie.* The duty of officers entrusted with the training of soldiers, he tells us, is not to look upon them as merely *matériel hommes, i.e.*, automata, who are to be dealt with in accordance with fixed *rules* which have acquired the force of *custom*, but rather is it their duty to realize that they are dealing with *êtres humaines, i.e.*, reasoning creatures, each of whom possesses a certain individuality and idioysncrasies of his own, qualities which must be taken into account if their military education is to be properly carried on so as to turn them out as efficient fighting men. It is a soul that the officer, who desires to escape from the servitude of the strict letter of the instructions that kills, requires.

Dealing with another subject, regret is expressed that as much has not been made of the opportunities which have offered during the past three years, in connection with the development of the Swiss Army, as would have been the case under *another inspiration.* However, it is hoped that profit will be derived even from the unfortunate experiences through which the Swiss Army has passed. It is stated that not only the Swiss Army but the whole Swiss Nation have been contaminated by the unfortunate spirit of imitation of things foreign and by a unilateral study of history and of the philosophies.

It is urged that as a first step a reform should be made in the system of instruction of the Swiss Nation. Regret is expressed that many publications of high educational value are not sufficiently widely read in Switzerland. It is stated that a French translation of Kuno Hofer's recent work, *Die Keime des Grossen Krieges* (The Origin of the Great War) would be welcome and that Zurlinden's *Der Weltkrieg* (The World War), should have a wider circle of readers among the romande Swiss. Attention is also called to Oeschli's *Tableaux de l'histoire universelle.* The

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people of the Swiss Confederation are recommended to turn their attention to the acquiring of a better knowledge of themselves, and to commence first by the instruction of their *élite*. Had Swiss officers, it is said, known what was due to Switzerland many unfortunate incidents might have been avoided and a salutary influence might have been exercised by the Corps of Officers during the past three years on the whole of the Swiss people under arms. Under such circumstances Colonel Wildbolz might not have written the article referred to earlier in these notes, and the humiliating search in the offices of the *Freie Zeitung* might not have been necessary. Germanic influences, probably encouraged by Germans in Switzerland occupying more or less official positions or by those possessing a more or less officious temperament, have led a certain number of Swiss officials into dubious paths of conduct. Complaint is made that in the present day there are to be found persons in Switzerland in high offices who have a leaning towards Imperialism, an attitude which is in direct conflict with all the healthy traditions of the old Swiss republicanism.

The Bill dealing with the revision of the law relating to the military forces of Switzerland is still under discussion. Colonel Secretan has contributed an article to the *Gazette de Lausanne* pointing out the defects in the Bill. It appears that only two situations are clearly provided for, that of peace and that of war. A situation bordering on war and that dealing with a prolongation of war conditions after active operations have ceased are ignored. It is suggested that a clause should be added to the Bill to provide for the contingencies in question.

INFORMATION.

A military society founded twenty-five years ago by the Clerical Establishment of the Swiss General Staff celebrated its first jubilee on the 28th and 29th July last at Neuchatel. On the second date mentioned, the question of the further continuance of the society came up for discussion. Some of the members, it would appear, have shown considerable irritation at the want of success attending the efforts of the committee of the society in their negotiations with the Federal Authorities in matters affecting the interests of the classes forming the membership of the society. Finally, it was decided not to dissolve the society. The chief grievance seems to be that the clerical staff cannot rise to a rank higher than that of lieutenant.

This number of the *Revue* concludes with bibliographical notices of new books dealing with the War.

W. A. J. O'MEARA.

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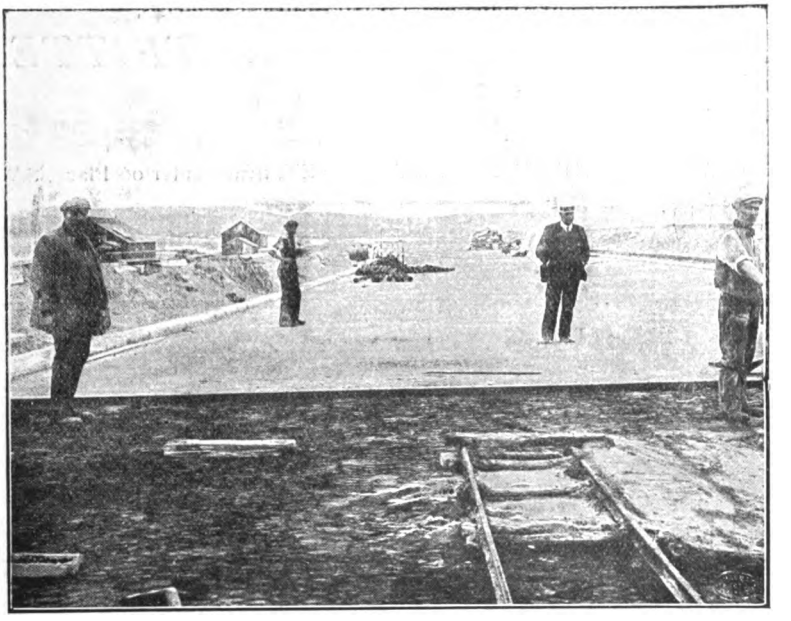

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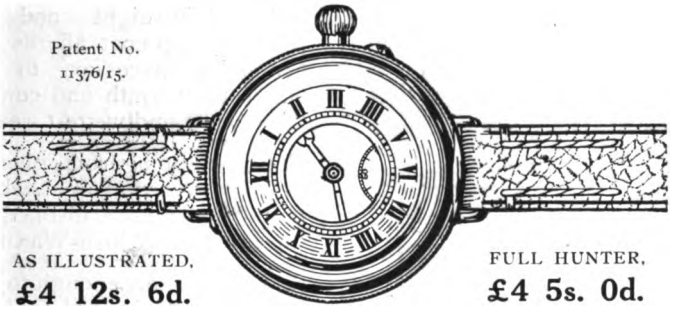

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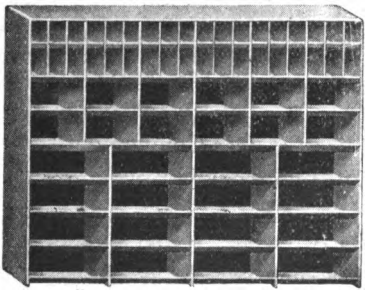

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PRACTICAL HORSEMASTERSHIP IN THE FIELD.

By LT.-COL. P. T. C. HERBERT, D.S.O., R.A.

(From the *Journal of the Royal Artillery*, by the courtesy and kindness of the R.A. Institution, Woolwich).

HORSEMANSHIP may be divided into two sections :—

A.—Control or Supervision.
B.—The care of horses whether in the lines or working.

A.—CONTROL OR SUPERVISION.

What everyone is looking for is to get the maximum of efficiency with the minimum of trouble. To attain this you must practice decentralization, *i.e.*, you must split up the horses of Units, Artillery, Infantry, Engineers, etc., into such small numbers as one man can easily control, and look after, and know all about. The maximum number that one man can be expected to control should never exceed 40, preferably 30. These numbers will actually depend on the Unit you are serving with. If you have 180 horses to look after, split them up into 30's, and give each 30 to an N.C.O. and tell him those are his command, that he will be held responsible for them, and that he will be judged by the condition in which these horses are kept. You serve two good ends in doing this. First you get the animals looked after. Secondly, you make a valuable N.C.O. Give a man his own show as early as possible in his career. A man with an incentive to work will generally do better than a man who has an allotted task and who knows that whether he does it well or badly the praise or the blame will be taken by someone else. For obvious reasons anything like a one-man-show is to be deprecated on service. You must start a system by which the loss of one man does not affect the running of the machine. If you have one man in charge of a large number of horses and something happens to him, it is very hard to replace him, and it takes a long time for his successor to pick up the threads. But if the unit is decentralized and broken up into small numbers, and the horses controlled in the way I will indicate, the loss of one or two men can be easily repaired. In the old days, 2½ years ago, when I was inspecting, some of the best units were what I call one-man-shows, and it was very hard to have to point out to the Commanding Officer that while we admired his work, the

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idea of one-man-control was hopeless on service. Now, if you have taken my advice and have split your units up into such small numbers or sections that they can be readily controlled by one man, the system I want you to start will render any unit, quite independent of who is in command: in other words the officer in charge of horse lines should be like the O.C. of a Battalion, responsible for the whole, but not interfering with the individual Company Commanders. To give a practical illustration. If the O.C. Horse Lines of a Unit wants to find fault with a driver or wants to point out something, he does it through the man who is in charge of the small section of horses that the man belongs to. We all know that practice and theory are not the same thing and that often an officer will have to give orders to a man as there is no time for anything else. But I think you will follow me in my idea. I mean: the way to get the best work out of a young N.C.O. is to treat him as if he had a command of his own; praise him or blame him; both will be passed on you may be sure. This plan may sound hard to work out and not worth the bother; you try it and I expect you will tell me after a bit, how much easier it is to run your units. Now say you have suitably sub-divided your units. I never interfere with the actual subdivision, that is a domestic arrangement. (In my own Regiment the actual subdivision is into sub-sections). The horses of each sub-unit should be handed over to the N.C.O. detailed, and he should be provided with an A.B. 136 easily carried in the pocket.

The book should be kept in the transport or wagon lines and not taken to the trenches or gun positions, except when the entire sub-unit goes out. If the Commander of the sub-unit has to go out on duty he will hand over the book to the man whom he leaves in charge. One page will be devoted to each horse.

The name of the N.C.O. in charge of the sub-unit should be kept up in a page at the end of the book and initialled by an officer each time a change is made. A page at the end of the book should be kept for horses with special feeds and entries should be erased when the horse resumes normal feeding.

In the column under "Remarks" should be included any peculiarities—bad illness, date of clipping, etc., and most of all date of shoeing and examination of teeth.

The book should be examined weekly by an officer to see that it is up-to-date, and produced on all inspections.

By this system every single horse is known and gets individual attention. It is a trouble to start, but once started it will repay you. In the old days if I wanted to know anything about a horse, it took a long time before anyone was found who knew all about him. Start this sytem and there will always be a man with a book who will give you a complete detail of any particular horse. If it does nothing else it helps an Inspecting Officer. If he sees something

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wrong with a horse and there is someone there who knows all about the horse and is ready to note anything of value in his book, he knows that, though there may be some temporary trouble, it will be speedily put right and he knows that the unit is being well cared for. By this plan a sub-unit can be handed over in five minutes, the man taking it over will know all there is worth knowing about any horse, what he does best and any other tips of value. Call horses by their pet names if you like, but also always have them numbered so that a stranger can soon know all about them. I think you will agree that this system provides some cure for the frequent changes in Command incidental to Active Service. I do not think there is anything more to be said about control. My system, I know, is a "counsel of perfection." Try it.

B.—Care of Horses.

This may be divided into two headings :—

1. Horses in lines.
2. Horses on the march.

1. *Horse Lines.*

These are now marked out and a Unit has to occupy a selected site. The only advice to be given under this heading is to be very careful when leaving lines to hand them over scrupulously clean, detail an experienced officer to stay behind with a sufficient party and remain until he is satisfied, and finally obtain a certificate from the incoming officer.

Lines should at all times be kept clean; encourage the N.C.O.'s in charge of small groups of horses to vie with each other as to who can keep his part of the lines cleanest.

Refuse should be burnt daily, care being taken not to mix mud with the other refuse, as this prevents proper combustion.

On the end post of each picket line fasten a tin and make men deposit in it any nails found in the lines. A frequent cause of injury to horses is that ·303 ammunition clips are dropped in the lines. I saw a case recently of a horse who had trodden on a round and punctured the sole of his foot.

Do not leave lying about the loose ends of wires taken from bales of forage.

When lines are taken over do not say to yourself "We shall only be here a short time, it is not worth bothering about comfort." Get the men to work hard for a day or two, it will well repay them later on. Make raised paths from where the men live to the horse lines; if you cannot get "duck walks" get rubble or the small branches of trees or anything that will tend to keep the men out of the mud; do all you can to keep the men grooming the horses out of the mud; let officers remember that for once they go into the lines

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a man will go six times. Dig drains to run the water off and keep them clean.

Picket Lines.—If possible get posts high enough to support two lines, one breast high for the horses, and the top one for the hay net; you want to keep the hay net off the ground but you don't want the horse line too high as it may stop horses lying down and they will get under it.

If you are compelled to use a line joined to another line with a hook, frap the hook with cord, as it is a frequent cause of injury to horses eyes and nostrils.

Exits to Fields.—When in lines exposed to possible shell fire, never be content with only one way out. If you have to harness up in a hurry and get out, you will appreciate having several exits; it will probably only mean making a hole in a hedge or bridging a ditch.

Wind Screens.—In winter in places where no stables or cover are provided, always erect a wind screen. Nothing starves a horse and tucks him up like a cold wind blowing on him all day; a screen erected to windward of the lines according to the direction of the prevailing wind, even if only 6 ft. high, will do much to shoot the wind over the lines. A few posts with branches of trees laced between them make a good screen.

If you are compelled to picket a horse away from the lines place him as close as possible to his own sub-section. Never fasten his head rope to a picket flush with the ground, as if he gets frightened he may get his hind legs caught and injure himself. Shackle his fore foot to a post driven flush with the ground, have the shackle about 2 ft. long, not longer, or tie him up to a post 3 or 4 ft. high, and he can run round that and not hurt himself. If the lines permit of it isolate cribbers and wind-suckers—the habit is catching. It is best to shackle a cribber by a fore foot.

Forage.—Build shelters for your forage and in winter always have something between the ground and the forage.

Harness.—Similarly as far as possible erect shelters for your harness and at any rate always have racks near your sub-sections, and keep harness out of the mud.

Food.—Oats.—Feed at least four times a day, and never give a corn feed without chaff. Encourage the young N.C.O.'s in charge of small groups to think of how each horse is doing, it makes all the difference to some horses if they can get their oats bruised, others want a great deal of chaff to stop them bolting their corn, some horses do better if 2 or 3 times a week they can get their evening feed soaked and mixed with a little bran if available, in short get the N.C.O. to study each horse and not to feed them all as if they were machines, he can always, through his officer, get advice and help from the Veterinary Officer.

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Hay.—Where no other chaff is provided at least one-third, and better one-half, of the hay should be chaffed. Always give the remainder in a hay net, never feed off the ground. Give the bulk of the hay at night—it keeps horses quiet.

Watering.—Water four times a day. Never water if possible out of a bucket. If troughs are not provided, rig one up with waterproof sheets or canvas. Let the N.C.O. in charge of groups always see his own horses watered and fed.

Light draught horses are entitled to 12 lbs. of hay and only 10 comes to railhead, the remaining 2 lbs. are drawn from the supply. It may be straw for chaff, or linseed cake, or green grass, or roots in the winter. See that they get it every day. When possible draw a proportion of bran in lieu of corn, and give horses a bran and corn mash 2 or 3 times a week. If near a village try and get the Supply Officer to get you brewer's grains, it makes a good night feed for a horse, but never keep these grains more than a few hours as they get sour.

Too much value cannot be placed on chaff. It makes a horse eat slowly and makes him chew, which causes the flow of saliva which helps to digest the food. Salt is very valuable and can be supplied. A pinch of salt should be given with each evening feed.

If horses at first do not seem to like brewer's grains, do not be discouraged from giving it to them, they will soon get to like it—always add a pinch of salt.

Nose-bags.—These should be turned inside out and exposed to the air, and if possible the sun, for an hour every day (the latter advice would perhaps be more useful in a land where there was any sun) and once a week they should be scrubbed out.

If this is not done, and more especially if you are able to give the horses wet mashes now and then, the nose-bags become very foul. Try and keep a small surplus of hay nets and nose-bags, and remember that if you want anything from the Ordnance, you must ask for it a month in advance. If you are temporarily short of nose-bags a few supplementary ones can be made out of corn sacks by your saddlers, but do not make more of these than is absolutely necessary, because the sacks are valuable and have to be returned.

Thin Horses.—The most frequent cause of horses becoming thin and debilitated is malnutrition, and this very often is primarily due to horses not chewing their food. The action of chewing produces salivation, and it is this acting on the gastric juices which helps the process of digestion. One of the reasons that causes horses to bolt their food and not chew is that the edges of their grinders become sharp. Prevention is better than cure, therefore do not wait until the horse has become thin and debilitated before examining his teeth. Every time a horse is shod let his teeth be examined, and if they are rough, get the veterinary officer to attend to them. The

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date of inspection of the teeth should be entered at the same time as the date of shoeing ; it is a trouble but if you only save one horse a month it is worth it.

As a rule do not give thin horses more corn. Their trouble is that they are probably not digesting the amount they are already getting, and if you add more you will only increase the trouble. Whether or not a horse is digesting what he gets, can only be told from his droppings. Get them as much of other extras mentioned above as you can, but always remember that the best food and best medicine you can give a horse is grass that he finds himself.

The best way to exercise all horses that have been doing hard work and want a rest, especially debilitated horses, is to keep the weight off their backs, and have them led out to crop grass. Always stand thin horses next each other, on the end of a line, a thin horse between two fat ones will get thinner, as they take his food.

When horses work at night especial attention must be paid to them when they return. Remember they will be tired, and when animals are tired their powers of digestion are at a low ebb.

If you can get bran for a hot bran and corn mash, it is very valuable at this time, add salt to it, and it is very palatable to a horse, and more easily digested than hard corn. If you cannot get bran try soaking the oats. Give them a small feed of corn and as much hay as possible. If you give a large feed of corn the horse will be too tired to chew it, and it will probably be undigested, and the next day the horse looks tucked up.

In one unit I commanded, we worked out a regular system of relief. When the sentry heard the wagons returning, he put on some water to boil, called the relief, some of them made a mash for the horses and others made something for the men, and when the horses had been watered, the drivers who had been out all night went away and a relief took the horses over. This is a little trouble to arrange, but when you are doing regular night work it is not difficult, and the men get to appreciate it ; always be thinking of the comfort of your men and horses, it will repay you.

Fitting Harness.—There are now plenty of experts about ; get the harness once properly fitted and never let one horse go into the harness of another horse ; a visit to any of the many horse shows will show people how harness ought to look ; these shows are most valuable as setting a very high standard of excellence. Harness should be frequently stripped and dubbed, it preserves the leather and prevents galls.

Shoeing.—This is, after the care of the teeth, the most important part of horsemastership. On service a horse should never go over a month without having his shoes removed or changed. The toes become long and if you suddenly have to go to a place where you cannot shoe horses for a week or so, this might happen at any time,

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and when you have to march again, you will lose a lot of shoes, and on these pave roads, this means a lot of lame horses with bruised feet. Here comes in the value of the shoeing lists, if the Farrier happens to forget a horse, the N.C.O. in charge of a small section of horses will note by his book that such and such a horse's time is up and draw the Farrier's attention to it. Officers should frequently have out for inspection all horses shod the day before, this gives a rough idea how the shoeing is getting on, he should then inspect a certain number of feet. I have been asked by officers what is the good of their inspecting feet when they know nothing about it. It is part of their duties, a most interesting subject, and will repay a little trouble. The Veterinary Officer or the Farrier will always be only too glad to help young officers to acquire a certain amount of knowledge, no good farrier minds having his work looked at. There are four cardinal points in shoeing that an amateur after practice can understand and criticize :—

i. *The Preservation of the Frog.*—This is very important, it is a pad put in the heels to prevent concussion. The way to get a good healthy frog is to develop frog pressure on the ground, if there is no pressure the heels become wired in and contracted, and the frog gradually disappears.

ii. *The Length of the Heels.*—These should not be too short, especially in heavy draught horses, but they must not be too long, or when a horse is working in heavy going he is apt to overreach and tear off his shoes.

iii. Seat the shoe well in to prevent brushing or speedy cutting, *i.e.*, let the horn of the foot if anything slightly project beyond the shoe, so that if the horse does hit himself he will not do much harm.

iv. *Avoid Dumping the Foot.*—When the foot grows, it must be taken down from underneath by rasping. To make a shoe look a better fit sometimes the horn of the foot is rasped in front—this is fatal as it takes away what nature has put on the foot to keep it in health. Frequently examine feet in the lines—there are many nails about.

Brushing and Speedy Cutting.—These are largely obviated by careful shoeing. They are due either to weakness or malformation ; if due to the latter cause try to alter the shoe so as to remove the cause. Supposing the off fore is being injured, try to get the seat of injury further away from the foot that is causing the injury. Try very slightly raising the inside quarter of the shoe of the leg that is being injured ; this will tend to throw the fetlock a little out of the line of fire. Great care must be taken not to raise the quarter too much as it will tend to throw undue strain on the suspensory ligament and any dodges of this sort should be tried with the consent and under the eye of the Veterinary Officer, but do what you can to obviate brushing. If you must do so, wear a brushing boot, the best is the ordinary dealer's boot, a piece of cloth, secured to the leg by a piece

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of tape, and then folded over. Try the dodge of raising the inside quarter very little, about $\frac{1}{8}$th inch at first, if the horse still brushes, wear a boot till his time of shoeing is up, and then raise the quarter a very little more. I have tried this with race horses with complete success, a horse only just touches himself, and a very slight alteration is all that is necessary.

Disease or Illness.—These are veterinary matters, and all we have to consider is the detection of trouble and reporting it. If an illness is taken in the earlier stages it is generally easier to cure. What aggravates ailments like coughing or slight lameness, is the animal being made to work while in this condition. It is criminal to work sick or lame horses.

2. *Horses on the March.*

Never let a wagon leave the lines without nose-bags and hay nets with a feed in them and a bucket for watering. When going into a waterless country try and carry enough water in tins to give the horses even a little water.

Halt as soon as possible after leaving the lines and especially after leaving ammunition dumps, to pick up and inspect horses' feet for nails.

Halt frequently as far as traffic conditions will allow and see that the N.C.O's in charge of the small groups of horses inspect them for harness galls and have their feet examined. Get the weight off the horses backs as much as possible. Never let men remain mounted when it is possible to dismount them, and never keep a pack on an animal's back when it is in any way possible to relieve it of its load.

Get officers to move about their commands and watch how horses work and how the men drive, a lot of debility is caused by bad driving, allowing one or two horses to do all the work.

HORSE BOOK.

UNIT.

INSTRUCTIONS.

1. This book should be kept in the Transport or Wagon lines. It should not be taken to the trenches or gun positions. In the case of Artillery when the Battery is not in action it should be in possession of, and kept up-to-date by, the proper No. 1 of the sub-section. At other times the acting No. 1 at the wagon line will keep it filled in up-to-date. In the case of other units it should be kept by the N.C.O. or man in charge of the sub-unit.

2. One page will be devoted to each horse. Entries will be made with a non-indelible pencil. The information under each heading must be complete.

3. The list of N.C.O's or men in charge of sub-units must be kept up and initialled by an officer every time a change is made.

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4. A page at the end of the book should be kept for horses with special feeds and erased when normal feeding is resumed.

5. Under "Remarks" should be included peculiarities of horse, bad illness, date of clipping, etc.

6. This book should be examined weekly by an officer and produced at all inspections.

PRO FORMA "A."

Specimen Page for Bulk of Book.

Batty. No. or Unit.	Sex.	Place in team.	Date joined.
65	Mare.	No. 1 Charger.	5-8-15

Date last shod.	Teeth. Examined	Rasped.
6-7-17 9-8-17	6-7-17 9-8-17	6-7-17

DESCRIPTION AND COLOUR.

Black. White tip on heel O. Hind. Three White patches on back.

REMARKS.

Good out rider also draft horse, but should be pegged out as she kicks when feeding.

PRO FORMA "B."

Specimen Page Near End of Book.

N.C.O's, GUNNERS, DRIVERS, ETC.

Nominal Roll—"C" Sub-Section.

No.	Rank.	Name.	Religion.	How employed.
63829	Sergeant	Scutt, H. E.	C. of E.	No. 1.

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PRO FORMA "C."

Specimen Page Near End of Book.

"C" SUB-SECTION RIFLES.

No.	Bolt No.	In charge of

PRO FORMA "D."

Specimen Last Page of Book.

LIST OF NOS. I.

Name.	Date taking over.	Date handing over.	Officer's Initials.
Sgt. H. E. Scutt	5-5-17	2-6-17	J.B.

PRO FORMA "E."

Specimen Inside Cover at End of Book.

FEED.

12 lbs. Oats.
10 lbs. Hay.
2 lbs. Straw (or green forage when available).

TIMES OF FEED.

7-30 a.m.	5-30 p.m.
12-30 p.m.	8- 0 p.m.

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WEIGHTS AND MEASURES.

By THE O.C. OF A FIELD CO., R.E.

IT has occurred to me that the following table of weights of Field Company wagons may be of interest to many of your readers.

On the occasion of a recent march, the opportunity occurred of passing the company wagons over a weighbridge, after they had been loaded ready for the road. The following are the actual weights recorded :—

	Kg.
1. Wagon, Limbered, R.E., No. 1 Section	1475
2. ,, ,, No. 2 ,, ...	1495
3. ,, ,, No. 3 ,, ...	1435
4. ,, ,, No. 4 ,, ...	1535
5. Cart, Officers' Mess (used for Mts. Section and Headquarters' Cook's Gear)	985
6. Water Cart (filled)	1285
7. Tool Cart, No. 1 Section	2400
8. ,, No. 2 ,, ...	2475
9. ,, No. 3 ,, ...	2395
10. ,, No. 4 ,, ...	2535
11. G.S. Wagon	3205
12. Pontoon Wagon, No. 1	3750
13. ,, No. 2	3690
14. Trestle Wagon	3885

Two blankets per man, and leather jerkins were being carried on the tool carts. Each wagon carried the horse rugs for its train. The driver of wagon No. 5 was weighed with the wagon. The bridging wagons carried nearly all the iron work for adapting them for mechanical traction, and one day's forage for all the horses in the company.

The weather had been continuously fine and dry for some 10 days before the weights were recorded. The company had moved six times in this period.

It is noteworthy that the weights of the bridging wagons work out considerably heavier than those given in the Field Service Manual for the same wagons.

The company has been on Active Service abroad for two years and five months.

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RAIL-CREEP AND CREEP OF RAILS.

Abstracts of Two Papers read at the Institution of Chief Engineers, on the 8th January, 1918.

1. "RAIL-CREEP." BY FRANK REEVES, M.INST.C.E.

IT occurred to the Author some years ago that light might be thrown on the cause of rail-creep by making a few simple experiments.

He began by passing a wooden wheel several times in succession, in one direction, over a planed white-pine lath resting on a hardwood bench, and found to his surprise the lath had moved bodily about 2 millimetres in the direction of travel, the total amount of the latter having been about 14 metres. Up to that time the Author, in common with many other railway engineers, had held the opinion that creep was probably in the main due to temperature changes, assisted by the movement of trains.

He, therefore, made a further series of experiments; and although he has not had time or opportunity to deduce, in a thorough and final manner, the laws which govern creep, he has come to certain conclusions which, as current literature on the subject almost wholly demonstrates that the cause of creep is not understood, he thinks it desirable to put on record.

The results of the further experiments, which were made not only with pine laths, but also with flat iron bars on side and on edge, and with a strip of india rubber, are given in a Table, and the conditions under which they were made are explained in detail.

The broad conclusions at which the Author arrived were :—

(1). Creep of rails is due primarily to deformation of the rail as the wheel passes over it. It may be likened to the movement of dough when rolled under a rolling-pin.

(2). The more violent the deformation, the greater the creep. That is to say, that creep is increased by (*a*) increasing the wheel load; (*b*) diminishing the rigidity of the rail, by either reducing its section or using a weaker material.

He then sets out in detail the evidence in support of these conclusions, and proceeds to discuss the influences of various factors as follows :—

Weight of Wheel.—This appears to be the most powerful factor affecting the amount of creep.

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Rigidity of Lath.—In every case the creep was much greater with the lath on the flat than with the same lath on edge.

Continuous versus *Intermittent Support.*—With the pine lath, the creep was always greater—from twice to four times—when the lath was supported on sleepers resting on the naked bench. The effect was heightened when the lath was on the flat as compared with on edge, which again bears out the theory that creep is an effect of deformation in the rail.

Yielding of the Support.—From the experiments with the pine lath the general conclusion is that interposing a strip of rubber between the bench and the lath made little difference, even reducing the creep, if anything (except in one case with a heavy wheel on a lath on the flat). It would appear that with a light wheel load and a rigid rail the yield of the road bed has little effect, and that little rather negative than positive ; but that with a heavy wheel-load on a flexible rail the creep is decidedly increased by a yielding road bed.

The Author suspects that the amount of creep produced depends on *the violence* of the distortion the rail suffers, rather than its total quantity.

The Author then advances a theory of the occurrence of creep in a rail under a rolling load, and finally sums up what is known about creep.

Creep, he concludes, is caused primarily by deformations of the rails under the rolling loads, assisted by temperature changes, which cause fish joints to slip and lessen the resistance. Where track is on a yielding road bed, creep is intensified, especially under heavy wheel loads. It is also accentuated by braking, in places where regular stops are made.

Creep is greater down hill than up hill, but is by no means absent on the latter.

It is usually asserted to be worse in hot weather than in cold. The Author thinks it would be more correct to state that the *effects* of creep are more troublesome in hot weather. It, however, comes to much the same thing from the practical permanent-way man's point of view. What probably happens is that the powerful expansion of the rails overcomes the resistance of the fish plates, and allows the creep, which before was kept within bounds by the resistances, to take effect and become troublesome at certain points.

Direction of Creep.—Creep is always with the traffic. On single lines there is normally no trouble with creep. But if there is a great preponderance of traffic in one direction, more or less creep takes place in that direction.

Remedies.—Creep can be resisted more or less completely by putting in enough anchorage or resistance.

The Author describes several devices for this purpose, including

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one of his own design which is in use on the Buenos Aires and Pacific Railway.

Amount of Creep.—It is easy to reduce creep to a small amount by putting in anchors, but it is not easy to suppress it entirely on double lines under modern conditions.

Differential Creep.—In double track the outer rails (the rails near the edge of the ballast) run more than the inner. This differential creep is the most troublesome and expensive of all. In laying double track the Author's practice is to set the outer rail back 2 ins., and not until it has crept forward " into square " are the rail anchors applied.

Bad Effects of Creep.—There would be little harm in creep if all the track were " open track," and both rails " ran " equally. Where it compels preventive measures is at connections with other lines, junctions, sidings, cross-overs, level crossings with other lines (railway or tramway), swing bridges, etc. The only practical way to anchor track is over long stretches and through numerous sleepers.

Design of Structures.—Many railway structures are affected by creep, and their design should take it into consideration. This requires special emphasis in the drawing office.

2. " CREEP OF RAILS." BY HARRY POWELL MILES, M.INST.C.E.

This Paper states that one of the difficulties with which the railway maintenance engineer in this country has to contend is the creeping of rails in a longitudinal direction ; and six chief factors in producing the movement are enumerated, only one of which factors tends to move the rails against the direction of the traffic, the other five producing a movement in the opposite direction.

The Author then describes briefly the effects which the direction and class of traffic, and the alignment and gradients of the line, have, in producing creep, the effect which the creeping rails have on the constituent parts of the permanent way, and the method of rectifying the positions of the rails after the creep has taken place.

It is observed that it is impossible to entirely eliminate creep, and the most efficient way of reducing it to a minimum is by keeping the road in good order and paying particular attention to having the rails tightly keyed up in the chairs ; but, in connection with this, special attention has to be given to the keys and the fishing of the joints during high temperatures, to admit of the rails expanding.

The Author then describes investigations of the phenomenon of creeping rails, made by him for a period of five years, on a length of line in this country of which he had charge, consisting of 850 track miles of main and branch lines, over which various kinds of traffic passed.

He takes as a special instance a length of 50 miles of railway

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where four lines of road run side by side, assigned to different types of traffic, which length of line rises about 330 ft. midway from its commencement, and falls nearly an equal amount to its termination.

Diagrams of this length of line are given, showing :—

(1). The gradients and alignment, and the points at which it was necessary to deal with the creeping rails during the five years mentioned.

(2). The percentage of rising and falling gradients, and the average annual percentage of the rails pulled back on each of the four lines on these rising and falling gradients.

(3). The percentage of lengths of straight and curves on two of the lines, and the average annual percentage of rails pulled back on these straights and curves.

(4). The maximum daily temperatures of the four summer months for the five years mentioned, and the total lengths of rails pulled back during each of these years.

The Author states what he considers the effect which each of these four cases had on the amount of creep which took place, and in conclusion gives generally the opinions he has formed of the effects which the class of traffic, and the gradients and alignment of the line, have in the production of creep.

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MEMOIR.

COLONEL H. M. VIBART.

BY the death last November of Colonel Henry Meredith Vibart the Retired List of the Corps lost an officer of strong character, wide experience and varied attainments, one of the few then remaining of those who originally joined the Madras Engineers under the East India Company. Colonel Vibart's whole service was spent in the Public Works Department. Arriving in India shortly after the Mutiny, he was not fortunate enough to be selected for active service on any of the expeditions in which the Madras Sappers and Miners subsequently participated. His duties were throughout of a civil character, and were mainly connected with irrigation. Though it did not fall to his lot to plan and execute any grandiose scheme like a Godavari Anicut, a Ganges Canal or a Periyar Dam, yet he did much useful unostentatious work, and a slight sketch of his career may be of interest as illustrating the conditions under which engineers in the Madras Public Works Department performed their duties during the third quarter of the nineteenth century. By his intimates Colonel Vibart will be remembered for his manly, straightforward character, his hatred of injustice, his loyalty to his friends and his liberal hospitality. Combative and a staunch partisan, he yet possessed the saving grace of humour. He was ever ready to take up the cudgels either on his own behalf, or on the part of any of his friends or subordinates whose merits had not, in his opinion, been adequately recognized. He always spoke his mind, and spoke it very plainly. This trait occasionally brought him into conflict with his superiors, and may have militated against his attainment of the highest departmental rank. He was an ardent hero-worshipper, as some of his literary works attest. A keen soldier, he devoted much of his leisure, especially after retirement, to military history and biography. His voluminous writings, to which further allusion is made below, appeal to large numbers besides his friends, and will live after him. An enthusiastic admirer of the beauties of nature and art, Colonel Vibart was an inveterate traveller in search of them. His periods of short leave were devoted to visiting places of interest in India; his furloughs were spent in journeyings on the Continent and in his own land. In Great Britain few spots were unfamiliar to him. He dabbled in sport, and in his younger days played cricket,

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Colonel H. M. Vibart.

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and occasionally shot. He never missed a race meeting, a cricket match, a boat race or other athletic contest if he could possibly attend it.

Colonel Vibart claimed that his family name is to be found in the Anglo-Saxon Chronicle. It is certainly an ancient one, but the branch of the stock from which he sprang appears to have been domiciled in the Netherlands in the sixteenth century. He was eighth in descent from James Vibart (1590—1666), whose father is believed to have fled to England to escape the persecutions of the Duke of Alva. Colonel Vibart's immediate progenitors served the Crown or the East India Company for three generations: his great-grandfather, another James Vibart, who married a Meredith, was a Captain in the 29th Foot; his grandfather, James Meredith Vibart, of the Bengal Army, retired as Lieut.-Colonel in 1798 and settled at Taunton, where he built Amberd House and brought up a family of seventeen children; his father, Henry Vibart, who married a Campbell of Ballochyle, was a member of the East India Company's Madras Civil Service.

The subject of this memoir, Henry Meredith Vibart, was the second son and fourth child of Henry Vibart. Born at Taunton on the 2nd March, 1839, he lost his father before he was a year old. With his elder brother Alexander he was educated at Cleveland House School, Brixton Hill. Both brothers eventually entered Addiscombe as cadets. H. M. Vibart received his nomination from Mr. Elliot McNaghten, a family connection, and joined the College early in 1856. In December, 1857, he obtained his commission as 2nd Lieutenant in the Engineers and went to Chatham for the prescribed course of 18 months, during which he was promoted Lieutenant. After a period of leave spent in Scotland and France he was posted to the Southern Presidency, and he embarked in the P. & O. steamer *Orissa*, of 1,200 tons, to travel to India by what was then called the overland route across the Isthmus. Landing at Gibraltar, Malta and Alexandria, he pursued his way to Cairo and thence to Suez, where he joined the *Madras* of the same tonnage. The voyage down the Red Sea occupied eight days, and that from Aden to Bombay ten days. He stayed a fortnight in Bombay, and was then permitted, after the liberal and leisurely practice of the East India Company, to go on leave and visit his brother at Ahmedabad. A tiny steamboat of 110 tons took him to Surat, whence he journeyed, mainly by bullock coach, through Baroda to his destination, experiencing much difficulty in crossing unbridged rivers. He spent a month at Ahmedabad, returned to Bombay by the same route, and there embarked for Madras by P. & O. *viâ* Galle, the railway across the peninsula being far from complete. He reached Madras in February, 1860, spent a month at the Club, and three weeks with the Brigadier commanding the Madras Artillery at St. Thomas's

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Mount, who was a family connection. In April he left for the Coimbatore District, to which he was attached for training. The railway helped him only as far as Vellore, and he travelled thence by road to Bangalore, and so by the Sigur ghat to Ootacamund and Coonoor. Four months at Coonoor were devoted to the study of Tamil and inspection of the barracks at Jakatala or Wellington, then in course of erection. From Coonoor he went down to Coimbatore, and spent nine months in working at language and hydraulics, and in the inspection of irrigation works. In May, 1861, he went to Madras for further study, passed in Tamil in July, and two months later was posted to the Tinnevelly District as 2nd Assistant Engineer. The railway took him to Salem, whence he visited the Shevaroy Hills. The journey from Salem to Palamcotta by bullock cart occupied a fortnight. The Cauvery was crossed in a coracle. He assumed charge of his first responsible duties at the end of October, 1861, just two years after he left England.

Vibart's range extended along the Tambrapurni River for some 40 miles to the sea, and comprised roads, tanks and channels on both banks, and an anicut across the river. Travelling was incessant. He had no house, but lived in a tent, and usually moved his camp every second day. In the course of six months he was transferred to the Ambasamudram Range, which covered 1,000 square miles. It was watered by two rivers, on each of which were fine falls, that at Courtallum being specially famous. Vibart remained here for a year, charged with the upkeep of numerous anicuts and irrigation channels.

In May, 1863, he went on privilege leave, travelling by palki to Trichinopoly, transit to Salem and rail to Madras. Thence he took steamer to Bombay, and visited Kirkee, Ahmednugger and the magnificent ruins of Bijapur, formerly the capital of one of the independent Muhammadan kingdoms of the Deccan. After a stay with his sister, Mrs. Battye, at Kaladgi, where he learned that he was transferred to the Kistna District, he returned to Madras by the same circuitous route. Following an excursion to Bangalore, where he played in several cricket matches, he sailed from Madras in September for Coconada. He travelled thence by canal to Dowlaishweram, then the headquarters of the Madras Sappers, where he met many brother officers. Passing on by canal to Masulipatam, he took charge in October of the Duggirala section of the Western Delta as Assistant Engineer, 3rd class. His section was traversed by two important channels, the Nizampatam Canal, which ran from the headworks to the sea, a distance of 40 miles, and the Western Bank Canal following the line of the Kistna. Vibart constructed three locks on these navigation canals as well as numerous smaller works, and he was responsible for the supply of water for irrigation. He lived in a thatched bungalow containing two rooms and an office,

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travelled constantly by boat and road for 20 days of every month, and rarely saw a European officer.

On the 1st November, 1864, the Masulipatam coast was visited by a cyclone, accompanied by a tidal wave which inundated 700 square miles of country and destroyed 30,000 people. The wind at its greatest violence blew from E.N.E. at the hour of high springs. The sea, driven into the bight of the coast, formed a wave 13 ft. above normal level, which penetrated 17 miles inland at farthest and 9 miles on an average. During its onrush and retreat it ruined the open "fort" as well as the town of Masulipatam, and swept away most of the adjacent villages. At Nizampatam—the Pettipolee of the East India Company's seventeenth century records—which was sheltered by the projecting coast line of the delta mouths, the water did not rise more than 5 ft. Vibart, in company with Colonel Anderson, the Superintending Engineer, left Duggirala by boat early on the afternoon of the 1st for Bezwada. At 8 p.m. the wind became so violent that they were obliged to tie up. They crept for protection into Anderson's palki, which was on board, but it afforded little shelter from the hurricane. They at length got ashore, intending to make for the nearest village, but on reaching the top of the canal bank, were thrown to the ground, had their pyjamas blown to shreds, and in this defenceless condition were bombarded with gravel. They were forced to spend the rest of the night in outer darkness, lying in mud and water. Towards dawn the wind abated, and the travellers succeeded in reaching the headworks on foot, half-naked and plastered with mud. Great damage was done to the canals. Vibart's kit had been sent on in a boat which went to the bottom, and he found his bungalow roofless when he returned to Duggirala.

Having passed through the three classes of Assistant, Vibart was promoted, in 1866, Executive Engineer, 4th grade. At the end of that year he obtained three months' privilege leave, which he utilized in making a tour in Northern India, visiting Calcutta, Benares, Allahabad, Cawnpore, Lucknow, Agra, Delhi, Roorkee and the Punjab, and inspecting the Ganges and Bari Doab Canals. He returned to his district in March, 1867, and shortly afterwards took charge of a range in addition to his own, with headquarters at Bezwada. Early in 1868 his eyes gave trouble, and he was granted sick leave to the Nilgiris. While at Ootacamund he was appointed to the charge of the Lake Reclamation Water Supply and Drainage scheme; but a medical board considered change to England necessary, and he sailed in July on long sick leave. After a period of travel in England and Scotland and on the Continent he was permitted, on the recommendation of Colonel Anderson, to visit irrigation and reclamation works in Italy. In company with Captain C. J. Smith, he spent two months in examining the canals of Piedmont and the works on the Po. This expedition was followed by a tour

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in Wales, Scotland, and the English Lake district. During 1870 he travelled extensively in Germany, Austria-Hungary, Switzerland, and France, returning to England just before the outbreak of the Franco-German war. At the end of the year he sailed from Trieste by the overland route, reaching India after an absence of two years and a half, in the course of which he was promoted 2nd Captain. From Bombay he proceeded by rail to Madras, the gap between the Kistna and the Tungabhadra being traversed by mail-cart. He was again posted to the Kistna, where he took charge of the whole Western Delta, and prepared a project for the final completion of the irrigation and drainage of the delta. Suffering again from his eyes in 1872, he was granted three months' sick leave to the Nilgiris, and was thereafter posted by the Chief Engineer, Colonel G. W. Walker, to Bangalore as Executive Engineer, 2nd grade.

At Bangalore, a British enclave in a native state—though the state was at that time administered by a British Chief Commissioner during the minority of the Maharajah—Vibart remained upwards of five years. His duties and surroundings were of a different kind from those to which he had been accustomed. He was in charge of military works, including the fort, arsenal and barracks. In place of comparative isolation, he found himself in a large military station with ample society. For the first time in his service he was able to occupy a good house. The troops comprised a regiment of British Cavalry, a battery of Horse Artillery, three batteries of Field Artillery, a battalion of British Infantry, the Sappers & Miners, and two regiments of Native Infantry. New works constructed by Vibart included a recreation room and canteen, a bakery, and cisterns for water supply. On the social side there were gymkhanas, cricket matches, theatricals and regimental sports, numerous balls and dinner parties given by the regiments and the Chief Commissioner, entertainments by the Maharajah, and an annual race meeting and rifle meeting. Vibart threw himself with enthusiasm into both work and recreation, and thoroughly enjoyed life, giving as well as receiving much hospitality. In 1874 a Camp of Exercise was formed, which was inspected by Lord Napier of Magdala, and a small committee, of which Vibart was a member, drew up a defence project embracing a fort, arsenal and place of refuge for Bangalore. Vibart's duties enabled him to visit many places of interest, such as Mysore, Seringapatam, the Cauvery Falls, the cantonment of French Rocks and the hill fort of Nandidrug.

In March, 1875, he was promoted Major, and later in the year was occupied in improving the roads in anticipation of the arrival of H.R.H. the Prince of Wales. The visit did not take place owing to the occurrence of sporadic cases of cholera in the station ; but Major Vibart went to Madras and attended the reception of the Prince and the festivities which were held during the week of His

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Royal Highness's stay at the Presidency town. At Christmas Vibart visited Sadras and the rock-cut temples at Mahavelipur, commonly called the Seven Pagodas. In April, 1876, he went home on privilege leave, arriving in time to witness the Prince of Wales's entry into London. Returning to Bangalore, he obtained permission to exchange duties for three months with the Executive Engineer at Madras, in view to exploring the Government archives in connection with his projected history of the Madras Engineers. By desire of the Duke of Buckingham, but contrary to his own judgment, he began, in January, 1877, the erection of a timber pier to facilitate the landing of grain during the famine then prevailing. The work was approaching completion when it was completely destroyed by a storm. The famine at this period was very severe. The deaths in Madras City were between 4,000 and 5,000 a month during the first quarter of 1877, or at the rate of 135 per mille per annum. The numbers on relief works or in receipt of gratuitous relief in April were:—Madras Presidency, 807,000; Mysore State, 127,000; Bombay Presidency, 318,000; a total of 1,252,000. The Viceroy, Lord Lytton, came to Bangalore in September to concert further measures for relief, and appointed Colonel Colin Scott-Moncrieff to be Chief Engineer of the Mysore State to carry them into effect.

In November, 1877, Major Vibart was transferred to the Trichinopoly District. He remained at Bangalore, however, on special duty in connection with some official prosecutions, until February, 1878, when he was deputed to Madura to superintend the restoration of Tirumal Naik's palace. After a visit to Kodaikanal spent in enjoyment of the lovely scenery of the Pulney Hills, he took charge at Trichinopoly in July. There he remained nine months, travelling over the district. In March, 1879, he was appointed Under Secretary to Government in the Irrigation branch of the Department, and he moved to Madras.

Unlike Bangalore, Madras was not a great military station, but it was the seat of Government and an important commercial centre. Besides the troops in garrison there were numbers of military officers employed in civil or quasi-military capacities, and there was a large European civil population, official and non-official. In the Public Works Department nearly all the higher posts were filled by military engineers, most of them Addiscombe men, for "Stanley" engineers were few and Cooper's Hill was as yet young. The writer well remembers the pleasant coterie of Royal Engineers stationed at Madras about this period:—Richard Sankey, the talented and versatile Chief Engineer; J. H. M. Shaw Stewart, the courtly Consulting Engineer for Railways; John Mullins, Chief Engineer for Irrigation; Hew Prendergast, Superintending Engineer; H. T. Rogers, the witty and genial Principal of the Engineering College; A. de Courcy Scott, Superintendent of the Revenue Survey; L.

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Conway Gordon, the clever if somewhat eccentric Examiner of Accounts; John Pennycuick, afterwards designer and builder of the Periyar Dam; C. J. Smith, most straightforward, and W. H. Coaker, most amiable of men; Herbert Wood, of Central Asian fame; Parry Lambert, P. Montgomerie, S. C. Clarke, H. M. Vibart, Ross Thompson and others.

A short time after becoming Under Secretary, Major Vibart was appointed to officiate as Superintending Engineer of the Madras circle, which comprised the districts of North Arcot, South Arcot and Chingleput, and the Buckingham Canal division. His duties then ceased to be executive and became administrative. During the nine months that he held this charge he travelled widely in his districts, visiting, among other places of interest, Pondicherry and the hill fort of Gingee. He also made extensive proposals for the completion and improvement of the Buckingham Canal. In March, 1880, he became Superintendent of Works, Presidency and Bangalore. After three months' privilege leave to England, which he spent in touring in Wales, Devon, and Cornwall, he returned to Madras, and at Christmas visited Hyderabad, Deccan. In April, 1881, Major Vibart took furlough, in the course of which he completed and published his *History of the Madras Engineers*, and made tours in various parts of Great Britain, returning to Madras in January, 1884. During his leave he was promoted Lieut.-Colonel. After a visit to Bangalore he was appointed Superintending Engineer of the 3rd Circle, with headquarters at Bellary. His charge embraced the districts of Bellary, Cudappah, Kurnool, and Anantapur, and included the Kurnool Canal. Spending the hottest season of the year on the hill of Ramandrug, where he leased and subsequently purchased a house, he gave the succeeding six months to constant travel, minutely inspecting the irrigation works of the circle. In the course of this tour he visited the extensive remains, at Hampi, of the capital of the ancient Hindu kingdom of Vijayanagar, inspected many hill-forts, and examined the diamond fields of Banganapalle, which were so celebrated in the time of Tavernier.

On the 24th December, 1884, Lieut.-Colonel Vibart married Miss Le Hardy, daughter of Lieut.-Colonel C. F. Le Hardy, of the Madras Pioneers, sometime Superintendent of Coorg, and member of an ancient Jersey family dating from the fourteenth century. The wedding took place at St. Mary's in Fort St. George, and Lieut.-Colonel and Mrs. Vibart, after a short stay on the Nilgiris, took up their residence in Bellary. There Vibart remained until 1888, spending the hot months at Ramandrug, and travelling throughout his charge during the rest of the year. On these tours Mrs. Vibart sometimes accompanied him. In 1886 he framed and submitted a comprehensive project for the irrigation of the Bellary district from the Tungabhadra River, and in the same year he became Bt. Colonel.

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In August he went to England on privilege leave for three months, a period devoted to touring in Scotland, Devon, and Cornwall. At the end of the year he was offered an appointment to advise on irrigation in Burma, but fearing that acceptance might interfere with his departmental promotion, he declined it. Christmas was spent at Poona and Bijapur, and in May, 1887, he finally left Bellary on transfer to the 5th Circle. The headquarters were Madras, but Colonel Vibart was permitted to reside during the hot weather at Bangalore, which was within his charge. The cooler months he gave to the inspection of buildings, bridges and irrigation works in the plains, especially in the districts of North and South Arcot. At Bangalore the question of water supply, which had been discussed for many years, had become urgent. Rival schemes were in the field, and both the Madras Government, representing the cantonment, and the Durbar, for the pettah, were in favour of separate sources of supply. Colonel Vibart, however, advocated a combined supply from the Hesargatta Tank in the valley of the Arkavati, and drew up a preliminary report in 1887. At that time the scheme was considered too costly, but it was supported by the Viceroy, and was ultimately adopted and carried out.

As a Superintending Engineer of the 1st class since 1886, Colonel Vibart had looked forward to the position of Chief Engineer for Irrigation as his ultimate goal in the service. When, in 1888, he saw another officer selected to fill a temporary vacancy in that appointment, he realized that further departmental promotion was improbable, and he applied for six months' special leave. Sailing in November, he devoted part of this leave to a tour in Italy and France. On his return to India in May, 1889, he found himself posted to the 4th Circle, and joined the headquarters at Coimbatore, his last, as it was his first, station. After inspecting in the Salem and Malabar districts he was given a year's furlough, and he sailed from Bombay at the end of November, 1889. His leave was subsequently extended by 15 months on medical certificate, and he finally retired on the 12th December, 1891, after serving 35 years and 8 months, or 34 years from date of first commission.

Colonel Vibart spent the winter of 1889–90 in travelling about Italy and France, and the following summer in the English lake district and the midland counties. Early in 1891 he settled in Cornwall Gardens, S.W., where he remained 14 years. During this period he made annual tours in England, Wales, Scotland, and Ireland, as well as in Holland and other parts of the Continent. Always interested in his old College, he wrote a valuable history of the institution. He was active in promoting the yearly Addiscombe dinner, which was first held in 1892. A few years later he wrote and published a monograph on Colonel Baird Smith's share n the siege and capture of Delhi.

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At the beginning of 1905 Colonel Vibart gave up his house, and, accompanied by his wife and son, began a comprehensive tour of the Continent, which lasted 18 months and embraced visits to a multitude of places in Italy, Austria-Hungary, Germany, Denmark, Sweden, and Belgium. The years 1907 and 1908 were given up to wanderings in England and expeditions to the Riviera and Switzerland, until, at the opening of the year 1909, he leased a house at Henley-on-Thames, where he spent his remaining years. He entertained numerous friends at his pleasant country residence, took much interest in the National Service movement, and devoted himself more and more to literary work. In 1916 he suffered from a severe attack of influenza, the effects of which he was unable to shake off. He gradually lost strength, and expired on the 1st November, 1917, leaving a widow and one son. The latter is now serving with the British Expeditionary forces. Two daughters died in infancy.

This sketch of Colonel Vibart's career would be incomplete without some detailed notice of his writings. His literary work began when he was stationed at Bangalore in the 'seventies with contributions to the *Madras Mail* on military and engineering subjects. He wrote a series of articles on the Russo-Turkish War, a defence of Hodson, of Hodson's Horse, against the strictures passed on that officer in Kaye's *Sepoy War*, and, somewhat later, papers on Famine Policy in Mysore. His next undertaking, a history of the Madras Engineers, was more ambitious. To the collection and verification of materials for this work he devoted his leisure hours for several years. He was granted access to the Government records in Fort St. George, for the exploration of which he employed a small staff of searchers and copyists. The work, begun in 1876, was completed and published during his furlough of 1881—1883. Entitled *The Military History of the Madras Engineers and Pioneers from 1743 up to the Present Time*, it was issued by Messrs. Allen in two bulky volumes of 600 pages each, illustrated by some 50 maps and plans. The work, which was reviewed in the *R.E. Journal* for September, 1883, is a monument of laborious research. It is not only an accurate chronological record of the services of the Corps, but is practically a history of most of the wars in which British-Indian troops have been engaged. It is a book to consult rather than to read, and its value would have been enhanced by the provision of a more copious index.

After his final departure from India Colonel Vibart contributed further articles on professional subjects to the *Madras Mail* and *Indian Engineering*, notably on the Water Supply of Bangalore and on Irrigation in the Bellary District. He also wrote to both home papers and Indian journals on the Defence of London. His proposals embraced a girdle of 42 forts round the metropolis, covering a perimeter of 170 miles.

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His next book was *Addiscombe: Its Heroes and Men of Note*, a handsome quarto volume of nearly 800 pages, published by Constable, profusely illustrated with views, plans, portraits, sketches and caricatures. The book was reviewed in the *R.E. Journal* for December, 1894. Colonel Vibart gave much time and infinite pains to the collection of materials for this work from the India Office records and many other sources. The volume, which was written at Harrogate in 1893, is divided into two equal portions. The first contains a complete history of the College, from its inception in 1809 to its extinction in 1861, interspersed with many amusing anecdotes of the professors and of pranks played by the cadets. The second portion comprises short biographies of officers who became specially distinguished in after years. The earlier part in fact describes the system of training the cadets; the later illustrates the splendid outcome due to—or, as some have cynically said, in spite of—that system. During the half century of existence of the College about 3,600 cadets passed through the establishment, of whom approximately one-seventh received commissions in the Engineers, two-sevenths in the Artillery, and the remainder in the Infantry.

In his book on Addiscombe Colonel Vibart had expressed views regarding Colonel Baird Smith's share in the capture of Delhi which provoked comment in one or two quarters. Although the leading historians of the Mutiny had fully recognized the brilliant services of the Chief Engineer, Colonel Vibart deemed it desirable to advance evidence in support of his contention that the chief credit for the capture belonged to Baird Smith. He accordingly published, through Constable, in 1897, a small volume of 172 pages entitled *Richard Baird Smith, the Leader of the Delhi Heroes in* 1857. A slight sketch of Smith's career is followed by a full description of his action during the siege and assault. The second half of the volume contains Baird Smith's contemporary letters to his wife at Roorkee, 75 in number. These are deeply interesting, as conveying an informal account of the siege. Owing, however, to the nature and purpose of Colonel Vibart's book, the author's attention is concentrated on his hero, and the Chief Engineer consequently stands so much in the limelight that other eminent actors in the great drama are thrown into the shade, and thus insufficient credit seems to be given to the aid and support rendered by Nicholson, Alexander Taylor, Reid, Chamberlain and others. The book contains a portrait of Baird Smith and a large-scale map of Delhi and its environs.

The last important work, and perhaps the best, to flow from Colonel Vibart's pen was *The Life of General Sir Harry Prendergast, V.C., G.C.B.*, published in 1914 by Eveleigh Nash. The volume, which covers 445 pages and contains 25 illustrations, chiefly portraits, was reviewed in the *R.E. Journal* for March, 1915. This

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tribute to the memory of his distinguished friend, for whom he entertained the greatest admiration, was a labour of love to Colonel Vibart, who ably performed his task. The author gives a full account of Sir Harry Prendergast's career as gallant soldier and capable political officer, and an appreciative description of his fine character; but he devotes perhaps unnecessary space to certain criticisms which were made on the General's management of the successful expedition to Upper Burma in 1885—criticisms which were handsomely disposed of by the Viceroy, Lord Dufferin.

Besides the works above mentioned Colonel Vibart contributed eleven articles to the *Dictionary of National Biography*. The earliest, on Norman Pogson, astronomer, was published in Vol. 46. The remaining articles, on General Boswell, Sir F. Traill-Burroughs, Colonel W. Chase, Sir F. Forestier-Walker, Colonel L. Irby, General W. Massy, Sir J. Raines, Sir J. Ross, Sir E. Shaw and Sir E. Walter. are found in the Second Supplement.

Colonel Vibart also wrote memoirs for the *R.E. Journal* on Colonel Collier (March, 1898), Sir Richard Sankey (June, 1909), and Colonel A. Le Messurier (May, 1916).

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REVIEW.

PAGES D'HISTOIRE, 1914—1917.

Published by the Librairie Militaire Berger-Levrault, 5—7, Rue des Beaux-Arts, Paris.

The 138th number is entitled *La Vérité sur les Déportation Belges* and contains an examination, from the historical and economical points of view, by Monsieur Fernand Passelecq of the measures adopted by the German Government in connection with the removal of the civil population of Belgium. In an introductory note the Editors of the *Pages d'Histoire* series call attention to the indignation which was aroused throughout the civilized world by the barbarous treatment meted out to the people of Belgium, by the German Government, in 1916 and 1917.

Monsieur Passelecq has recently published an important work, dealing with the proceedings of the German Government, entitled *Les Déportations belges à la lumière des documents allemands*, a work which will rank as one of the best scientific publications on the subject of the Great War; No. 138 of the *Pages d'Histoire* series is an abridged edition of this work.

On the 27th February, 1917, Monsieur Emile Vandervelde, the well-known Belgian minister, delivered an address at the Nancy Town Hall. This address has been appropriately published as a Preface to the volume under review.

Monsieur Vandervelde, on the occasion referred to, after thanking his audience for the warmth of their welcome, stated that in addressing them he was fulfilling a duty which he owed to his countrymen. A few weeks previously he had received from the occupied territory of Belgium an extremely sad communication, which was dated 18th November, 1916. This communication contained the resolutions passed by the Belgian Labour Associations of every description; resolutions that raised an energetic protest against the deportations *en masse* then being carried out by Germany and which were pressing so heavily on the proletariat of Belgium.

Monsieur Vandervelde quoted the text of the decree issued from the German G.H.Q., on the 3rd October, 1916, in which it is stated that persons capable of working will be forced to work and that persons, summoned to undertake any work, on refusing to do so will render themselves liable to imprisonment and a fine not exceeding 1,000 marks. Provision is also made in this decree for punishing the Communes in

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cases where two or more persons jointly refuse to obey the behests of the modern Huns.

Monsieur Vandervelde stated, during the course of his speech, that at the date in question thousands of Belgian citizens had already been removed from their homes. The numbers deported from the zone of operations were estimated at 50,000, whilst the grand total of the deported was thought to exceed 100,000.

In recent times the deportations had been proceeding more slowly, as the protests of neutral countries had had some effect. But although the people were no longer being removed in large masses, individuals were still being sent away; the selection of the victims being made on carefully studied lines. For example, the skilled workers who would be of use in German munition factories were being specially marked out for attention. These were offered a contract to sign which, if accepted, would have involved the betrayal by them of their own country, but, at the same time, in Von Bissing's words would have ensured them a *comfortable income*. On the other hand, if these workmen refused to bind themselves by such a contract exile and forced labour faced them as the alternative.

Germany's measures constitute three criminal acts combined in one. Firstly, a flagrant act of unjustifiable interference with the right of innocent individuals to choose their own domicile is committed. In the second place, a *régime* of forced labour is introduced. Finally, the forced labour is of a kind which compels men to act treasonably against their own country, the most inexpiable of all crimes.

The Germans have asserted that the deported population have not been directly compelled to undertake work of a military nature. In a few cases this is true. But indirectly the German Army has benefited, since the Belgian workmen have in such cases released Germans who have been sent to the front. However, there are many cases in which irrefutable testimony is available to prove that deported Belgians have been employed directly on works of a strictly military character, *e.g.*, on the construction of trenches, military railways, etc.

Not only in the matter of their conscience have these unhappy Belgians had to suffer, but in the matter of their food also; indeed, they have been treated as beasts of the field, having had to subsist on a mixture of corn and raw beetroot. In cases where individuals have refused to work they have had to suffer corporal punishment, and even the words of sympathy addressed to them by the sojourners in the lands to which they have been deported have been reckoned against them as offences committed by them meriting imprisonment; a punishment which they have, in consequence, had to undergo.

Having related his facts, Monsieur Vandervelde then proceeded to point out in what way the measures adopted by the German Government constituted violations of International Law. He admitted that probably there may be no express prohibition in that code against deportations *en masse*, for it was not for a moment dreamt that acts of this nature could ever be perpetrated in the age in which we live. For a similar reason, parricide was not forbidden in express terms by the laws of the ancients. In spite of the silence on the subject in the Hague Con-

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ventions, the deportations are an undeniable, flagrant and self-evident violation of express engagements entered into in writing by German officials.

On the day after the fall of Antwerp, nearly the whole of the population of that city took refuge in Holland; they had not forgotten the experiences of their unfortunate compatriots of Visé, of Termonde, and of Louvain. The Dutch Government, disturbed by the overrunning of their country by this human flood, communicated on the subject with the German Government. The latter replied giving an assurance that Belgians could re-enter their own country and would not be disturbed there. The Archbishop of Malines also entered into correspondence with von der Golz, the then Military Governor of Belgium, urging that Belgians who might return to their own homes should not be called upon for military service or to undertake any work in Germany; von der Golz called personally at the Archiepiscopal Palace and in the presence of his own A.D.C.'s and of the entourage of the Archbishop formally promised that Belgians would be neither compelled to work in the military interest nor to serve as soldiers. The Military Governor of Antwerp also addressed to the Archbishop a letter, which was read in all Belgian churches on the 18th October, 1914, wherein the following promise occurred:—"The young men need not be in the least afraid of being conducted into Germany either for the purpose of being enlisted in the Army or for the purpose of being employed on forced labour."

It was on the faith of the foregoing promises that Belgian refugees, encouraged by their priests, by their magistrates, even by the Dutch authorities, by degrees, drifted back to their own hearths and homes. By degrees also, barriers of electrically charged wires, etc., were put round their country by the invaders, who finally converted it into an immense cage to which there is only one door and that opens an exit into Germany and into the invaded territories of France, and nowhere else.

The people of Belgium have not taken their ill-treatment at German hands lying down. Deputies, senators, bishops have all at various times made suitable representations to the German Military Authorities and have reminded them of their promises, asking them, at the same time, how they could reconcile their acts with these promises! The German replies have been characteristic of the nation; their measures have been taken, they say, not in the interests of Germany, but in that of Belgium and of Belgian workmen, to remove them from the temptation to "keep holiday" and to cure them of habits of laziness. The pretext invoked by Germany that there are hundreds of thousands of shirkers and that compulsion is necessary to drive them to work in order to earn their living is the weakest of excuses; many of those deported are not labourers at all, but men who have occupied administrative posts in their own country. For example, among the deported are the whole of the Members of the Supplies Committee of Arlon. That there is unemployment in Belgium is, alas, too true; more than half-a-million men are without work and are dependent for their sustenance on the bounty of the American Committee and of the Belgian Committee. These men cannot be ranked among the idlers nor among

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ordinary strikers. The German invasion has naturally brought many workshops and industries to a standstill, and, hence the widespread unemployment that prevails in what was formerly looked upon as one of the human beehives of the world. Not only the German invasion, but also the subsequent acts of the German authorities in levying enormous contributions on the occupied territories are alone responsible for the existence and continuance of the industrial truancy in which half-a-million souls are participating. At the time Monsieur Vandervelde spoke (25th February, 1917) the War contributions levied in Belgium by the German authorities had already exceeded £40,000,000. In some cases, where factories might have been kept going and thus have provided employment for Belgian workmen, the Germans have seized the raw materials and have had machinery dismantled and sent into Germany. It was made impossible for men to work and, at the same time, they were reproached for not working.

The municipal authorities of Belgium had decided to provide employment for those out of work, but the German authorities forbad the adoption of this course, stating that as these bodies had already to bear the burden of heavy War contributions there was no money to waste on those out of work. Summing up Monsieur Vandervelde stated that the real reasons for so large a number of men being without employment were :—

The prohibition placed on the execution of municipal work.

The confiscation of machinery, raw material and the means of production.

The War contributions, which exceed the amount which the country is capable of raising.

Lastly, the war itself, which, so to speak, started the industrial truancy.

The Belgian workmen, Monsieur Vandervelde told his audience, could find work and that at high rates of wages. But such work would be of a nature to benefit Germany and to prejudice their own country. To the eternal honour of the Belgian proletariat, be it said, they have refused all temptations to betray their country's interests ; their strike has been one against War, and to those that have offered them bread as the wages of treason, they have replied with firmness ; of such bread we will have none.

Because they will not undertake work of this kind, since they have entered into a solemn obligation not to work for the invaders, is it that they have been requisitioned ; those possessing the amplest proportions and greatest robustness have been selected for expatriation as was the case ages ago when negroes were shipped to the slave markets.

Monsieur Vandervelde proceeded to describe the methods employed by the Germans in dealing with the population in a region near Wavre. The Germans started their abominable proceedings by posting notices at 7 a.m., at an hour when the greater part of the workmen had already started on their daily labours in the workshops ; these notices ordered every one in a particular district to report at a given hour at Wavre. The women and children, realizing the situation, went off, with tears in their eyes, to the workshops in search of their menkind. Whole families then set out in the wet, on a foggy November morning, for the

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rendezvous named by the German authorities. On arrival at Wavre they were shut up in the school buildings. German officers then proceeded to interrogate and examine their prisoners. Those whom they considered unsuitable for their requirements were made to file to the right, the others to the left. To the latter were then presented papers for their signature, the affixing whereof would have been an act of treason. The immense majority refused to sign these papers and were thereupon led between rows of bayonets to railway trains which had been got ready for their conveyance to unknown destinations. The women, children and the patriarchs looked on the meanwhile. Those to be deported were bundled into cattle trucks and could be heard shouting: "We will not sign! We will not sign!" Occasionally, the better to give expression to their defiance and to the spirit of rebellion there was in them, some began to sing the *Brabançonne* and then the *Marseillaise*. In order to drown the audible manifestations of defiance against their authority the Germans brought on to the scene a military band. The latter responded to the flourishes of the conductor's baton with redoubled energy, but there came forth directly from the lungs of men the sounds of the *Marseillaise* striking notes in the air louder than the vibrations produced in instruments of brass and by the beating of drums, big and small. The strains of the hymn of Liberty overpowered the music of Tyranny.

Monsieur Vandervelde informed his audience that Belgian workmen had recently addressed an appeal to their friends, to neutrals and to their enemies regarding the treatment which the civil population of Belgium was experiencing at German hands. They had said to the German Socialists: "This is not war; whatever may be your opinion as to the causes of the War in this matter, it is your duty to raise a protest with us." The minority group of German Socialists had, to their credit be it said, duly entered an emphatic protest. Others there were who had associated themselves in a half-hearted way with these German Socialists. But these others qualified their protest, and to them the Belgian workmen accordingly addressed a biting retort, saying to them: "We did not ask from you words of sympathy, but we asked for deeds; on that day when you display your manhood, we will thank you."

Neutrals had been moved by the appeal addressed to them and had responded to the request made to them. If their protests, said Monsieur Vandervelde, had the appearance of timidity, the excuse existed that they were living in a state of terror, a state which would only come to an end with the termination of the War. It was to her own efforts, to those of her Allies and to those of a coalition of all free peoples that Belgium was looking to put an end to this state of terror. They have all one common aim in view: to exact respect for the rights of mankind, those elementary rights, the imperishable glory for securing whereof belongs to the French Revolution. These rights can be summed up in the words: liberty, property, safety and resistance to oppression.

Liberty! There is to-day in Belgium only that liberty which remains in the marshes of the Yser and in the trenches of W. Flanders.

Property! Of this the invaders have helped themselves by War

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contributions and other exactions in kind. The people of Belgium did for a time retain that property which it valued most: the *habeas corpus*, the property in their own bodies, the property in their own labour. To-day, their rights even in respect of this last form of property have been taken from them.

Safety! Solemn treaties had promised Belgium security against aggression. Undertakings given in writing, and subsequent to the outbreak of War, contained a promise that the people of Belgium would not be torn from their hearths and homes, and that they would not be compelled to work, and particularly would not be required to do so against the interests of their native land. The documents on which these undertakings were recorded have, however, proved to be but "scraps of paper," and have been treated in the same manner as more sacred writings.

To those who live under the shadow of the German terror there have been denied liberty, property, safety. But one supreme right remains to them: the right of resistance to oppression!

Monsieur Vandervelde concluded his speech by drawing attention to the closing words in the appeal of the Belgian workmen: "So far as we are concerned, even if force should succeed for a time in reducing our bodies to servitude, never will we surrender our souls. And one word more: whatever may be the tortures that we may be called upon to suffer, the peace we are wishing for is one which will bring with it the independence of our country and the triumph of justice." And he added: "This is their last word. We would be unworthy of them, if this were not also our own!"

The portion of the volume contributed by Monsieur Passelecq consists of ten short chapters.

Chapter I. is entitled *Les Déportations d'Octobre*, 1916, *à Février*, 1917. We are reminded of the surprise, coupled with indignation, and in some cases even with incredulity, caused throughout the civilized world when it was learnt in October, 1916, that the German Government had decided to subject the civil population of Belgium to the same treatment, deportation with forced labour, as that meted out to the population of Lille, Roubaix and other towns in N. France in the previous April. The first announcement of what was in the air was made in a semi-official communication sent from Brussels to the *Kölnische Zeitung* and published in its issue of 13th October, 1916. Later, the full text of the proclamation dealing with the matter was made public; it was learnt therefrom that the German G.H.Q. were responsible for having inaugurated this reign of terror. The proclamation was dated 3rd, 1916, and in its preamble an attempt was made to justify the measures proposed to be adopted on the ground that they were inspired by solicitude for the social welfare of the people and rendered necessary in the interests of public order. In the references to the matter in the German Press, these aspects of the subject were emphasized, and an attempt was made to create the belief that the German Government was faced with a crisis in Belgium owing to the truancy of the working classes and in consequence of the stoppage of the entry of raw materials into the country, owing to the British Naval Blockade. It was stated that

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only in Germany could work be found for the Belgian masses and it was for this reason that it had been decided to remove them from Belgium.

A German Proclamation dated the 3rd October, 1916, provided for the enforcement of the above measures in the zone of operations only, *i.e.*, in the regions under the immediate control of the German military authorities and wherein Martial Law was in force; in the case of the remainder of Belgium, the deportations *en masse* were carried out on the basis of a new interpretation of an earlier Proclamation (dated 15th May, 1916) which had made persons alleged to have committed the offence of refusing to work amenable to the German Military Tribunals.

The Belgian people had already for the space of two long years been subject to oppression, crushed by War contributions and requisitions, deprived of all liberty and cut off from the world; they had endured the German despotism without being cowed into subjection. The Germans now bethought themselves of another plan for breaking their spirit, viz., by striking them in their most tender part, by depriving them completely of their personal liberty and by destroying all family ties.

In carrying out their dastardly work, the Germans demanded the assistance of the Belgian municipal authorities, ordering them to prepare lists of those alleged to be playing truant. The Belgian constitution prohibits any such interference with the liberty of the subject; on the contrary it provides for the safeguarding of the inviolability of a man's home and of his domestic life. The Burgomasters and municipal authorities, in consequence, resolutely refused to associate themselves with the German authorities; the Germans therefore seized by force all the information concerning the civil population that they were able to obtain in the municipal offices and compiled their own lists. That they acted in a most arbitrary fashion almost goes without saying. The local military authorities were given very considerable latitude in carrying out the orders given to them, no regard was paid either to the age, to the social class or to the occupations of the unhappy victims; 24 hours' notice, accompanied by threats, was, as a rule, the only warning a man received of the order for his deportation. Thus, a sword of Damocles was suspended over every home in Belgium. The rule was that everyone was *deportable*, unless proof to the contrary could be produced by any particular person wanted by the German authorities. As a matter of fact, the final decision on the matter was entirely in the hands of those detailed to give effect to the decrees of the German military authorities.

The working classes were affected far and away more than any other class, though many young men and married men in comfortable circumstances were drawn into the net together with those in receipt of relief from the public authorities; nor were the sick and those feeble in body spared. It would seem that in certain places women too were deported.

The deportations *en masse* were carried out district by district; beginning in W. Flanders, it extended stage by stage eastward and continued throughout the months of October, November and December, 1916, and of January and February, 1917. The exact numbers of men

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removed is not known, but there were between 300,000 and 400,000 unemployed in Belgium; the Germans announced their intention to deport all of them.

In a note published by the German Legation at Berne in the *Journal de Genève* of 3rd April, 1916, it is stated that, at that date, 60,000 Belgians had been deported. Monsieur Passelecq states that, large as this number is, it does not disclose the full numbers, he estimates that more than 100,000 of his countrymen had been sent to Germany by the date in question.

Some details are given by Monsieur Passelecq of the heartrending scenes that took place at certain of the Belgian towns in connection with the carrying out of the deportation orders. He points out that one would have to go back to the times of the Mongol and Turkish invasions to find a record in history of acts showing a similar contempt of the rights and liberties of the human race. Extracts are also given from the cry of alarm raised on the 7th November, 1916, by the Belgian bishops, who found themselves helpless spectators of this terrible drama.

The Belgian Government addressed a memorandum on the subject of the deportations to the other Powers on the 1st February, 1917, and described therein the refinements of cruelty with which those unwilling to sign the German contracts of hire were treated. It is stated that reliable reports had reached the Belgian Government in relation to the indescribable sufferings of the thousands of innocent victims collected by the Germans in their camps and that the nature of the reports is such as to raise feelings of intense indignation in the breast of every civilized being.

The main responsibility for this abominable system of deportations rests, says Monsieur Passelecq, on the shoulders of the German military authorities, and ultimately on those of the Kaiser.

Protests have been raised against these deportations by the judiciary, by scientific societies, by the episcopate, by the Municipal Councils, etc., etc.

The German Governor-General has in some cases definitely refused to receive the documents containing the protests in questions, in others he has made no reply.

It is stated that official protests were lodged at the Wilhelmstrasse by the United States of America, Holland, Spain, Switzerland, and the Vatican. The German Foreign Office met these by giving shuffling answers and by telling lies, in the meantime the deportations continued to take place. The universal silence on the subject, which existed in the German Empire, was broken in the Reichstag in November, 1916, by the Socialists. Three members of the minority group denounced the acts of the military authorities with considerable vehemence; the denunciations of the majority group were pitched in a lower key. Nevertheless the majority group of the Socialists in spite of their protest, joined with the other parties in the Reichstag in voting into Law on the 2nd December, 1916, the Bill for the mobilization of the Man Power, etc., of the German Empire, although this measure included a provision for the mobilization of deported Belgians, Lithuanians, and Poles; the Socialist minority alone voted against the Government on this occasion.

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After repeated protests on the part of Holland, Spain, and more particularly of the Vatican, the Kaiser, after a delay of five months, was reported by the Wolff Agency to have provisionally suspended the deportations and to have promised to return to Belgium those who *had by a mistake* been deported for *truancy*, of which as a matter of fact they were not guilty.

It was believed that the tragic experiences of the poor Belgians were now about to come to an end. This, however, proved to be a cruel illusion.

Chapter II. is entitled *Les Déportations à partir de Février*, 1917, and continues the story begun in the preceding chapter. It would appear that the deportations of Belgians which had been proceeded with on the pretext of *solicitude for their social welfare* practically ceased about the 15th February, 1917. Further, it is now certain that 12,000 out of the 60,000 Belgians admitted by the German Government to have been deported *by mistake*, on the ground that they had been playing truant, were repatriated (*vide* reference made earlier to the Note published by the German Legation at Berne in the *Journal de Genève* of 3rd April, 1917).

But this was, Monsieur Passelecq points out, only a deception practised by German officialdom, for:—(*a*). The major part of the deported Belgians were still retained in Germany for employment in connection with the Teutonic *corvée*.

(*b*). The Belgians repatriated were only those whose health had failed owing to the bad treatment received by them in Germany and were persons no longer capable of performing a good day's work.

(*c*). The Kaiser's promise did not apply to the thousands of unhappy people employed in the German War zone in France.

(*d*). Generally speaking, the Kaiser's promise was not binding on the German *military authorities*, who could continue to requisition and to deport Belgian subjects *under the plea of military necessity*.

Semi-official notes were published in the German newspapers on the 6th and 13th May, 1917, which, read between the lines, indicated the limitations referred to in the two last paragraphs above.

However, at the time that the deportations ceased to be carried out under one pretext, they were recommenced *under new pretexts*. On the 12th May, 1917, the Belgian Government received information that *a fresh round up of the whole of the male population in the Province of Luxemburg, and also a census and the requisitioning of all women had been put in hand*. In the communication received by the Belgian Government it was stated that all males, between 15 and 65 years of age, were required for work on the frontiers of France and Germany. The instructions issued by the German authorities laid it down definitely that one burgomaster, one priest, and one notary per commune were alone to be allowed to remain. The women are divided into three categories :—

1. The healthy ones ; these were to be employed on agricultural work in order to replace men.

2. Mothers of infants in arms ; these were to be allowed to remain at home.

3. Those not included in the two preceding categories ; these were to

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remain at the disposal of the German Government, for purposes not made known.

Social rank was to be entirely ignored. Later, similar measures were adopted in the district of Mons, at Tournai, at Alost, etc. Towards the middle of May, 1917, hundreds of men were also rounded up in the suburbs of Brussels. The Germans now tore down the mask which they had put on when the deportations first began. They now openly admitted that *the measures being adopted by them had no other object than to serve directly the interests of the German Army; the people of Belgium were to be roped in, and to be made by force to co-operate in the operations and in the execution of the military works of the German Army.*

The *excuse* was different but the *crime* remained as before; indeed, the crime may even be said to have become more heinous. Contempt was now openly heaped by Germany on the whole body of International Law. The first kind of deportation, the deportations made on the pretext of solicitude for the social welfare of the people, had been strongly supported by the German Press which devoted considerable attention to the subject and also by persons holding official positions in the German Empire who were continually making public references thereto. The apologies of the sophists and the arguments of the apologists in relation to these deportations imposed upon the credulity of the ill-informed in neutral countries and for this reason it is necessary to throw some light on the proceedings of the German authorities.

Chapter III. is entitled *La thèse allemande et ses contradictions*, and in it is briefly investigated the defence of the German Governor-General. It is pointed out that four closely-printed columns of matter published in the *Norddeutsche Allgemeine Zeitung* of the 14th November, 1916, scarcely suffice for the Statement of Defence prepared on behalf of Governor-General von Bissing (this Statement had already been furnished to the Berlin correspondent of the *New York Times*). In it some typical phrases occur, *e.g.*, the economic and implacable stranglement of Belgium by the British blockade is condemning half-a-million Belgians to look for their support to the Public Authorities; all remedial measures attempted have failed owing to want of raw material; public works have had to be stopped, owing to the fact that unproductive undertakings were weighing heavily on the financial resources of the Municipal Authorities, etc., etc. A certain number of Belgians had, the Defence proceeds, voluntarily gone to Germany to work there, but the enemy's propaganda, which urged patriotic objections based on wrong conceptions, had stopped the immigration into Germany. It had become imperatively necessary therefore, for the Government to compel those who were wavering and hesitating to adopt a definite course to save them from themselves.

Germany, that is to say, protested that the Teutonic *corvée* and the deportations were by no means in the nature of acts of repression nor were they reprisals; rather were the measures in question, they claim, precautionary, philanthropic, nay even paternal; whilst being to the advantage of those deported they reflected honour on the conscientiousness of the German Administration. The complete *dossier* relating to the proceedings of the German authorities in Belgium will

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be found in Monsieur Passelecq's *Les Déportations belges à la lumière des documents allemands ;* a brief outline of the contents of this work is given in the volume under review.

Dealing with the reasons which caused the German Government to adopt the drastic measures to which reference has been made earlier, Monsieur Passelecq points out that if the true explanation for the deportations is that there was a complete stagnation of industry in occupied Belgium, as alleged by the Germans, then it was an injustice to charge Belgian workmen with truancy owing to pure laziness. On the other hand, if the complaint is that Belgian workmen were really merely loafing and idling away their time, then it is necessary to assume that there was enough work for them *in Belgium ;* in the latter case the deportation of workers *to Germany* was nothing more than an arbitrary act and one which it was not necessary to justify by bringing the stagnation in the Belgian industries so prominently into the foreground.

That the greater part of the industries of Belgium are at a standstill is a fact which unfortunately is incontestable. But what is contestable is Germany's argument that this condition of affairs is imputable to the state of War, in face of which the benevolence of the invaders is powerless.

The unfavourable position in which the Belgian industries find themselves at the present time does not arise from any accident or from some *force majeure* in which German volition has played no part. The German authorities on the contrary are personally responsible for this state of affairs and their responsibility in the matter is indeed of a two-fold nature :—

It is by the direct action of the German Government that the crisis in the German industries and labour market have been caused.

It is by the deliberate acts of the German Government that the Belgians have themselves been prevented from applying the necessary remedies which they have been ready to do.

Governor-General von Bissing's Statement of Defence only lightly touches upon the legislative measures adopted by the invaders in the occupied territories and then alone to support the claim that the German Government has devoted itself seriously to the task of rehabilitating the economic situation of Belgium.

Truth and German claims are, however, in direct conflict here. It can be positively stated that the German authorities have been principally, if not exclusively, concerned in exploiting, and most methodically exploiting, the resources of Belgium in the interests of the German Empire and for the direct benefit of its War measures.

Chapter IV. is entitled *Le Plan Rathenau et son application à la Belgique* and deals with the vast organization of the economic forces of the German Empire adopted by Von Falkehayn, the Prussian Minister of War, almost as soon as hostilities began. The scheme put in force emanated from the brain of one of Germany's greatest industrial magnates, Dr. Walter Rathenau, the President of the *Allgemeine Elektrizitäts Gesellschaft.* Mr. Swing, the Berlin correspondent of the *Chicago Daily News,* published more than a year ago an article (reproduced in

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the *Basler Nachrichten* of the 5th January, 1916) based on information derived from German official sources; in it he gave an account of the *Kriegsrohstoffabteilung in Kriegsministerium* (Raw Materials Directorate of the German War Ministry), which was in control of the 36 industrial departments, known as the *Kriegsrohstoffgesellschaften*, concerned with all products necessary for Germany's Munition Works.

The replenishment of raw materials in Germany and the removal of the same from the occupied territories occupied a foremost place in Rathenau's programme. The official plan for the systematic exploitation of the resources of the occupied territories was put into operation at the earliest possible moment in Belgium, which was not only a manufacturing country, but possessed also large accumulations of imported raw materials, apart from what it produced.

Monsieur Passelecq, leaving on one side the acts of aggression committed against Belgium and the question of the vast war contributions levied in this country by the German Military Chiefs and Governors, proceeds to deal with legislative enactments, relating to the economic situation, published from time to time, in the *Gesetz-und Verordnungsblatt* of Brussels. This German official gazette is close packed with notices relating to sequestrations of property, taxation, inventories, restrictions, interdictions, etc., etc. Industry, commerce, agriculture, finance, labour are all passed through the sieve winnowed, fanned and garnered in succession and with reiteration. One knows that when a swarm of locusts settles on the land it devours every blade growing thereon until no green thing is left in the locality visited by it. German Colonial Science has an expressive word to denote that particular method of exploitation *à outrance* which resembles the locusts' method of dealing with the harvest of the fields; it is called *Raubwirtschaft*, the economics of squeezing dry. In the publication referred to above, during the two years 26th October, 1914, to 20th October, 1916, sixty-six distinct ordinances were promulgated dealing with sequestrations, requisitions, the creation of commercial monopolies in favour of a German Central Mart, etc., etc. Many of these ordinances were modified and stiffened up by successive supplementary ordinances, so that the number of legislative measures affecting the industries, agriculture, finances and internal commerce of Belgium promulgated reached the grand total of 96 in the period mentioned.

Simultaneously, other legislative measures were enacted to impede, to suspend or to regulate the export, import and transport of merchandise; from the beginning of 1915 to the 12th September, 1916, eleven principal ordinances relating to these matters were promulgated and twelve supplementary ordinances modifying and stiffening up the principal ones. Among materials the import of which was forbidden were those of which Belgium was much in want, but the stocks of which existing in neutral countries Germany did not wish to draw upon (*e.g.*, sebacic acid, fats, soap and saponified oils, etc.).

Attention is also called to the fact that the removal of machinery and plant from the factories in Belgium was in many cases confided to the representatives of German firms which had been directly competing against the Belgian industries in which this machinery,

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etc., was employed; in this manner many Belgian trade secrets have come to the knowledge of the Germans.

Since December, 1914, the Belgian provinces have been under the necessity of paying into the German Treasure Chest a monthly contribution at first amounting to 1½ million sterling, raised in November, 1916, to 2 millions, and in June, 1917, to nearly 2½ millions sterling; the ordinary taxes have, at the same time, been maintained and in some cases increased. The German authorities have refused their own currency in payment of the contributions and taxes levied by them, but have insisted on such payments being made in Belgian coinage. The rate of exchange for the mark has been fixed at a minimum of 1fr. 25c. The use of German currency is forbidden even for the purpose of paying for food supplies purchased for the civil population. When the foregoing measures had brought about the results intended—the inflation of the value of the mark and the accumulation of the German coinage in the banks—the German authorities set to work to appropriate the specie in Belgium. This campaign was opened by the arbitrary arrest and deportation of Carlier, the Belgian Bank Director; the banks were then forced to surrender the keys of their cellars and strong rooms under the threat that if they refused to do so these institutions would be immediately and summarily wound up. The Germans confiscated thus 650 million marks belonging to the State and private banks of Belgium.

The foregoing examination proves conclusively that the legislative enactments of the German authorities affecting Belgium must have had one object alone in view; to put in force, *as completely as it was possible to do so*, the Rathenau plan for squeezing Belgium dry.

Chapter V. is entitled *Confirmations allemandes* and deals with the confirmatory evidence relating to the situation in Belgium available in German documents. Monsieur Passelecq deals with only three of these documents in the volume under review. In the first place he refers to the series of articles written by Dr. Ludwig Ganghofer, an intimate friend of Wilhelm II. and the special envoy of the *Neueste Münchner Nachrichten*, a Bavarian official organ. The articles in question are accompanied by numerous statistical tables and attempt to describe the work of the German administration (on the whole extent of the Western Front). The principles on which the German authorities have been acting are, he tells us, as follows:—"*Draw as little as possible from Germany for the use of the Army; draw as much as possible from the conquered enemy country; and all that may be surplus to the requirements of the Army, but may be of use to the country, remove to Germany.*"

Dr. Ganghofer states that *during three months, the conquered territories had furnished four-fifths of the needs of the German Army*, and that although at the time of writing a scarcity had begun to show itself in the conquered regions in many commodities, nevertheless *these regions were still able to meet two-thirds of the wants of the German Army in the Western Theatre.* At a moderate estimate Germany was saving 3½ to 4 million marks a day by the adoption of this procedure.

According to Dr. Ganghofer the *benefits derived from the German*

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victory had added notably to the profits of the economic War which Germany was waging in conformity with International Law (!) against the conquered territories, i.e., by the utilization of the property of the State (?), such as *corn, wool, metal, valuable timber and other products*, which had been *transported in enormous quantities* from Belgium and Northern France into Germany. "*Germany economizes and gains by this economic War conducted in a commercial spirit, an additional sum which may be put at 6 to 7 millions per diem.*" Thus the total profit realized by the German Empire on the Western Front, since the beginning of the War *may be estimated to amount to about* 80 *millions sterling;* a striking victory for Germany, representing as it does a saving and an increase in her economic resources; whilst at the same time a crushing defeat for the enemy, *amounting to the complete exhaustion of all the financial resources in the occupied territories.* This should put an end to the saying that *the Germans are not a practical nation.*

A year later, on the 16th January, 1916, confessions of a similar nature to the above fell from the lips of General von Wandel in the Reichstag. When acting as Minister of War, von Wandel rose in his place to reply to the criticisms of the Deputy Stucklen against the Commissioners who were enforcing the Rathenau plan. "If large quantities of supplies had been transported to the country (*i.e.* to Germany)," he said, "this was due, in very large measure, to the prudent and indefatigable activities of the Economic Commissions. They have merited well of the Fatherland."

In a Memorandum (published posthumously) by General von Bissing, written in 1915, and regarded as his "political testament," the General claims that "the supplementary advantages that we have obtained from the Belgian industries by the seizure of machinery, etc., must be assessed at as high a value as the harm done to our enemies by the deprivation they have suffered of the means of increasing their fighting power."

To all which Monsieur Passelecq retorts: "Then, we will, in our turn, say if the economic activities of Belgium are dead, it is neither the War, nor the blockade but the German authorities themselves that have killed them. It is Germany who, by her legislative and administrative measures, has brought industry to a standstill in Belgium, paralyzed commerce, put an end to the raising of crops and ruined public and private finance. *It is she who, by her deeds, has brought about or thus aggravated this social calamity of industrial truancy, which she hypocritically now lays to the charge of the Belgian workmen when she accuses them of idleness and evil intentions.*"

It must be remembered too, that Germany acted thus at the very time when her official representatives, Marshal von der Golz and General von Bissing, had promised their collaboration in the task of promoting the economic resuscitation of Belgium and called upon Belgians, in the interests "of a patriotism of a really healthy kind," to co-operate with them in the work of administration.

Chapter VI. is entitled *Les Belges s'efforcent d'enrayer le chômage: l'allemagne les en empêche et cherche à éttouffer la concurrence belge* and deals with the efforts of the Belgians to make the best of a bad situation

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and the measures the Germans adopted to checkmate Belgian competition.

Monsieur Passelecq reminds us that the Germans made no serious efforts to keep within bounds the curse of non-employment and the misery arising from their egotistical acts; a situation with which, by their own admissions, they were unable to cope. On the other hand, the Belgians struggled against the great peril threatening their country only to be thwarted at every turn by the German authorities.

The martyrdom suffered by Belgium in 1914 brought to her widespread sympathy, the sacrifices which she made to defend her independence and, at the same time, to fulfil her treaty obligations won for her the admiration of the whole world; however, if the resistance which Belgium has continued to offer in the trying circumstances in which she has been placed were better known, she would rise still higher, were that possible, in the esteem of all right-thinking peoples. An appreciative account of the stoical spirit with which Belgium has met military misfortune and of the fortitude with which her people have borne themselves whilst in captivity has recently appeared in a volume by a Scandinavian publicist bearing the catching title:—*The Country which does not wish to die.*

Many neutrals have spoken in praise of the magnificent qualities of fraternity which the Belgians have been exhibiting in their day of trial; they have also called attention to the remarkable spirit of ingenuity, of order and of method which the local authorities of Belgium have displayed in providing their compatriots with assistance and in organizing measures for reprovisioning the country. The "Comité National Belge," ably seconded by the American Commission for providing aid to Belgium, has been able to extend its benefactions to the invaded regions of Northern France. But not a single *pfenig* has been contributed by the Germans to the enormous expenses which have been incurred in this work.

In addition to the direct assistance which the Belgian local authorities gave to the unemployed, they also attempted to provide indirect relief by carrying out public works of a nature on which much unskilled labour could be utilized. They also started technical classes. The German authorities took advantage of this situation; in order to bring about a change of opinion in foreign countries in relation to the complaints which were rife as to the disastrous effects on the Belgians of the legislative measures mentioned above, during a period of 18 months, they flooded the German Press and the neutral Germanophil Press with articles containing most extravagant claims regarding the economic recovery of occupied Belgium. But the real situation could not be conjured away by any measure of German dialectics.

The lot of the lower classes living in occupied Belgium has not, at any time, been too happy; but thanks to private charity, to the contributions made by the Belgian local authorities, to the generosity of foreigners and to the help given by the American Commission and the Belgian Government, some 36 millions sterling have been spent, between October, 1914, and the autumn of 1916, in providing them with the bare necessities of life, so that they have been spared at least starvation.

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General von Bissing, in the interview which he gave to the correspondent of the *New York Times*, to which reference has been made earlier, claimed the credit for having initiated the public works started for the unemployed by the Belgian local authorities. But a countryman of his, Dr. von Behr-Pinnow, sheds a light on the late Governor-General's works which unconsciously puts a totally different complexion on the situation. Von Behr-Pinnow had the opportunity of seeing the work of the German administration from a position of vantage behind the scenes, in May, 1915, when he visited Belgium, in Professor Langstein's company, as one of the delegates of the "Kaiserin Victoria Haus," of Charlottenburg. The following is an extract from an article which he contributed to the *Kölnische Zeitung* of the 26th May, 1915:—

"But there are other reasons which have actuated the Governor-General in acting as he has in this matter; it was necessary, *even in the interests of Germany*, that Belgium should not be completely exhausted, or exposed to famine, a situation that might have had to be combated with German money or—what might have been still more burdensome—by German food stuffs; on the contrary, it had to be arranged that the country should, in some way, be able to live on its own resources. This is why the Governor-General has not been content alone to admit American supplies into Belgium, but has cleverly made attempts, which were attended with success, to reduce industrial truancy by a progressive re-starting of those industries which are of most importance in the country. *But this was done in such a way, be it understood, that German industry* could not in any way suffer thereby."

Here we have the German ideals with regard to the moral and social obligations of the Governor-General towards the people whose welfare was temporarily under his care. In his conduct Von Bissing had to subordinate everything to the interests of German industry. The occupation of Belgium was to be made the weapon for defeating the Belgian competition with German industry. The German authorities have in their dealings with the territories occupied by them fully availed themselves of the opportunity which existed for framing measures having for their main object the killing in Belgium of all industrial and commercial competition with German trade. Although not authorized in legal form, nevertheless, it has come to the knowledge of the Belgian Government that the following taxes have been imposed and are being collected by the German authorities on exports from Belgium:—

1. A duty of 1 per cent. *ad valorem* on all exports.

2. A duty of 30 florins (50 shillings) per ton on all metallurgical products exported to Holland.

3. A duty of 10 per cent. *ad valorem* on glass wares and other merchandise exported for consignment overseas.

The above fiscal and other measures directed against the industries of Belgium have brought her internal and export trade to a complete standstill. There appears to be little doubt that in thus killing Belgian competition the Germans have all along had in view the intention of ultimately getting hold of Belgian labour for employment on munition works in Germany.

Chapter VII. is entitled *Le Chômage forcé institué par les Allemands*

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and contains a continuation of the story dealing with Germany's responsibility for the existence of unemployment in Belgium. By Germany's economic policy, the German authorities have made the Belgian workmen *chômeurs forcés* in the interests of German industry and the German Army. By Germany's social policy, she has attempted to make these "*chômeurs forcés*" into *travailleurs forcés*, for which purpose she has deported and enslaved them.

In its Memorandum of 1st February, 1917, the Belgian Government definitely charged the German Government with having brought about a stagnation in the commercial activities of Belgium with the express design of enrolling the *chômeurs forcés* in the munition factories of Germany and in the Belgian workshops requisitioned by the German military authorities.

Monsieur Passelecq gives a brief list of the class of public works which had been started by the Belgian *Comité de Secours* and the Local Authorities for the unemployed. Although the work had, in many cases, been begun, the German Government suddenly issued an order prohibiting their continuance in virtue of the provisions of a proclamation dated 2nd May, 1916. The reason for this drastic step was stated to be that these works provided employment for *chômeurs, i.e.*, those alleged to be playing truant. The Germans, however, offered to employ the workmen, who would have to be dismissed by the Belgian Committee and Local Authorities, either in Belgium or in Lorraine, or in Germany.

A certain number of men belonging to the Province of Luxemburg continued at work in the communal workshops still kept open, but as soon as the German authorities discovered this, they peremptorily forbad the employment in any particular commune of men other than those belonging to that commune.

It is clear then that it is *by order of the German authorities* that the Belgian workmen have crossed their arms. No blame can attach to them for having refused the offers of work made them by the invaders of their country, since by doing so they would only be supplying the needs of the German Army and furthering the interests of their enemy. It was owing to the check which their manœuvres met with that, in obedience to the behests of their own military authorities, the German Government perpetrated the supreme iniquity; a proclamation was issued on the 3rd October, 1916, which aimed no longer at the institution of the *corvée* in Belgium, but at its institution in Germany and in France, so far as Belgian labour was concerned.

Chapter VIII. is entitled *Les Arguties du Gouverneur-Général von Bissing*, and in it attention is more particularly concentrated on the quibblings of General von Bissing. The General has persistently denied that the deportation scheme was in any way connected with the design of compelling the Belgian people indirectly to co-operate with the Germans in their War measures; he insisted that the steps taken were forced on him by the economic conditions due to the British blockade and to the War itself; the budgets of the Belgian local authorities were, according to him, so heavily burdened as no longer to be able to bear the ever-increasing expenses in connection with the unproductive works on which the labour of the unemployed was being utilized; there

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remained therefore only one thing to be done and that was to send the Belgian workmen to that locality where they could be offered remunerative work and where they could be properly fed, *i.e.* to Germany.

As regards the excuse that the deportations were due to the British blockade, Monsieur Passelecq points that, at the end of the summer of 1915, a Belgian Industrial Committee acting in concert with the *Commission for Relief in Belgium* presented to the German authorities the draft of a contractual arrangement. The scheme outlined in this draft had been agreed to by the British Government and was intended to provide for the admission into Belgium of raw materials required by the Belgian factories and the subsequent export of the articles manufactured therefrom; the profits arising from the operations contemplated were, under this scheme, to be lodged and locked up in a neutral bank.

The scheme, it will therefore be seen, was one which, whilst it permitted the Belgian industries to continue in operation, provided for the safeguarding, from the requisitions and levies of the invaders, of the surplus between selling prices of Belgian commodities and the costs of their manufacture. It had been intended to put the scheme into force under the control of the *Commission for Relief in Belgium* which was itself under the patronage of representatives of Belgium, the United States of America, Spain and Holland; there was, in consequence, a prospect that the interests of all concerned would be protected.

However, the German authorities showed no inclination to accept the scheme; they allowed five months to slip by without even acknowledging its receipt and, needlessly to say, they did not put up a counter-proposition. It was not till the Memorandum of the 7th February, 1916, prepared by the British Foreign Office, criticizing the strange indifference of Germany to public opinion, was issued that the German Government deigned to reply (official notes of 22nd February and of 9th March, 1916) and then they only twisted and distorted the proposals put forward. What does, however, stand out clearly is that the German Government refused to give the indispensable guarantees which were necessary before Belgian industries could be exempted from the operation of the blockade; an exemption which Great Britain was perfectly willing to concede.

Dealing next with von Bissing's alleged anxiety with regard to the safeguarding of public order, Monsieur Passelecq points out that as great as is the antipathy of the Belgian people for the nation that so treacherously invaded their country, they have maintained a complete mastery over their own conduct. During the two years and more that their country has been under the rigours of the harsh *régime* instituted by the enemy not a single *émeute* nor any trouble of any sort has broken out. All Belgians in authority have ceaselessly preached the need for calmness and patience to their suffering compatriots.

The Germans can surely have nothing to fear from a populace which is unarmed, whose constitutional liberties have been suspended, whose Press has been suppressed, whose rights of social intercourse and of public meeting have been restricted and whom they have caged in behind a wire fence charged with high-tension electricity. They practically

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admit as much, for they have only small military garrisons in those parts of Belgium not actually in the zone of trench warfare.

Von Bissing explains his measures in a general way as being necessary because *we are living in times of War.* Monsieur Passelecq takes the General's arguments *seriatim* and points out that the *permanent* War contribution of 40 million francs per mensem levied by Germany since December, 1914, is less *productive* and would be a lighter burden on the budgets of the Belgian local authorities than would be the works organized by the latter for the unemployed. Admitting for a moment that the British blockade and the War have been affecting the economic life of Belgium, he asks in what way the conditions in blockaded Germany are so different from that in blockaded Belgium as to provide in the former country remunerative work in abundance whereas in the latter country no work exists?

He also asks, whence comes the strange inequality in the matter of food supplies available in the two countries? What has become of the crops raised by Belgium, of the food stuffs sent for the Belgians by the United States of America?

Monsieur Passelecq continues: "In any case, I want to know how does your alluring description (*i.e.* von Bissing's) of the food supplies of the German workmen agree with that given in the letter of 27th September, 1916, from Marshal von Hindenburg to Chancellor von Bethmann Hollweg (*Norddeutsche Allgemeine Zeitung* of the 17th November, 1916, 1st Edition), particularly in the case of the Rhine regions to which the deported workmen are being sent, wherein it is said:—It is impossible for our workpeople to remain in full vigour if we do not succeed in distributing equitably to them fats in sufficient quantities. As to the coal basins of Ruhr, of the Siegerland (near Cologne) and other industrial regions, I am informed that *they have not yet succeeded in making an issue in sufficient quantities, much less on an equitable basis.* In the Siegerland, it would seem that, *for two months past, only ridiculously small quantities of fats have been available.*" Monsieur Passelecq accepts von Bissing's admission that whilst Germany has raw materials for her industries, at the same time Belgium has not. Again he asks, what is the explanation for this new difference in the situations in the two countries?

Germany may be obtaining raw materials, he says, from certain neutral countries: Holland, Scandinavia, and Switzerland. If so, why is Belgium not likewise able to import from the same countries?

And this abundance of employment that Germany offers the Belgian workpeople, is it not employment either in connection with munition supplies or that for which German labour is not available owing to the workers having been conscripted into the Army? Monsieur Passelecq leaves it to the German authorities to say to which of these two alternatives an answer in the affirmative would be a veracious reply to his question.

All the steps taken by Germany in mobilizing her civil population, and in organizing her economic activities, have been directed towards the conversion of that Empire into an *Institution of War.* The deportations represent, without a shadow of a doubt, the last phase in the

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execution or extension of the Rathenau plan; *these deportations constitute then the violent incorporation of the whole of Belgium, with its population and all their effects, into the War organization of the German Empire.*

Chapter IX. is entitled "*Fides teutonica*" and treats of the breaches of faith of which Germany and her officials have been guilty in relation to the treatment of the civil population of Belgium, who were induced to return to their homes from Holland, whither they had fled in October, 1914, in the days preceding the fall of Antwerp. Matters which have been fully dealt with in the reference made to the speech of Monsieur Vandervelde, at Nancy, which forms the Preface to the volume under review.

The text of undertakings given by the German military authorities to respect the liberty of Belgian citizens is set out by Monsieur Passelecq in this chapter. On the faith of this undertaking and of written and verbal assurances given to Cardinal Mercier by General von Huehne, Military Governor of Antwerp, the clergy in the Province of Antwerp were directed, as explained by Monsieur Vandervelde, to make known the German promise from their pulpits.

The Dutch authorities at the request of Germany posted up notices inviting Belgian refugees to return to their homes under the promise referred to above. In order to bring pressure to bear on the absentees, who owned property in Belgium, to comply with the foregoing invitation, the German authorities threatened them with a tenfold increase in the taxes and contributions, which they were levying in the invaded territories, in the event of their not returning to their homes.

The Belgian people had not at this time fully realized that modern Germany has adopted a code of honour which is not based on the ethical notions by which other civilized peoples regulate their intercourse with nations and individuals; they had, in consequence, to rue their lack of perspicuity. As soon as Germany's perfidy in the matter of the deportations manifested itself Cardinal Mercier at once entered a strong protest on behalf of his fellow countrymen; von Bissing, however, put him off with a reply full of casuistry.

The Municipal Authorities, too, refused to assist the German Government in carrying out their designs, as already explained. They had not long to wait in order to learn that the Zabern spirit is still alive. *What order soever the German Military Authorities may promulgate to that command must all civil authorities outside the German Empire, as within it, render immediate and complete obedience.*

Tournai for its recalcitrance received a demand from the German Military Authorities for the payment to them of a fine of £10,000 sterling within six days, with an additional £1,000 sterling per diem in respect of each day's default in meeting this demand.

It is methods of administration of the kind described above that to-day meet with the most complete approval in Germany. In an article which appeared in the *Frankfurter Zeitung* of the 29th October, 1916, it is stated that *all those who have seen the officials of the Fatherland at work in the occupied territories cannot fail to be struck with the fact that they are carrying out their duties with the scrupulous conscience of a German.*

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Chapter X. is entitled *Conclusion* and contains a final extract from the Memorandum of the 1st February, 1917, prepared by the Belgian Government in relation to the deportations. In this extract, after recounting the outrages suffered by the unfortunate Belgian people at the hands of the invaders of their country, the enemy as well as the friends of Belgium are informed that " No abuse of force will break down the resistance of the Belgian people to the yoke of their oppressors. History bears witness to their inextinguishable desire to maintain their independence and to the enduring spirit with which they are ready to combat every form of tyranny."

W. A. J. O'MEARA.

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NOTICES OF MAGAZINES.

REVUE MILITAIRE SUISSE.

No. 9.—September, 1917.

THE ITALO-AUSTRIAN THEATRE OF OPERATIONS.

The first part of the article dealing with the above subject was published in the number of the *Revue* for April, 1917 (*vide R.E. Journal* for August, 1917). The text is accompanied by a sketch-map of the front on which the Battle of the Isonzo was fought in May, 1917.

Some writers dealing with the operations of the Italian Army have contrasted the present situation with that which prevailed during the War of 1866. The favourable opinions already formed concerning the handling of the Italian Army in the Great War have, if anything, been considerably enhanced by the comparison of to-day's situation with that of half a century ago, which ended so disastrously.

In 1866, Garibaldi received orders from General La Marmora immediately to vacate the Trentino at a time when the main body of the Italian Army was being prepared for employment in another theatre. The situation of the Italian Army was, 50 years ago, unfortunate in every way; the Battle of Custozza had completely disorganized it. In consequence, Austria was in a position to impose her own terms, knowing well that they must be accepted. This is what she did do. When Italy entered upon this War in 1915, she had, so to speak, to take up the threads at the point she had to drop them some half a century ago.

The Italian G.H.Q. on the 9th July, 1917, issued an official statement in which the strategy of the Italian plan of campaign is indicated. It was as follows:—"At first to engage the enemy on the whole front from Tolmino to the sea by an intense artillery fire which would leave him in uncertainty as to the real point of the decisive attacks; next to assail him on his right wing, N. of Gorizia, then to strike a second violent blow against his positions on the Carso." Considering all the difficulties that the Italian Army has been up against, the results that they have obtained, viz., the seizure of the summit of the Cucco and the immediate approaches to Hermada, must undoubtedly be considered as eminently satisfactory. On the other hand, the Austrian counter-offensive has failed to achieve the results aimed at.

The positions along the line of ridges Cucco-Vodice gave the Italians an enormous advantage, as therefrom they were able to command all the ground in front of them and the approaches thereto. Every minute gained in attaining the positions in question was of inestimable value to them, and the nature of the country they were thus able to occupy lent itself admirably to the construction of defences tending

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to make the territorial gain permanent. Having succeeded so far the Italians assumed a localized defensive attitude. They had to make the whole of their front equally strong, since the piercing of their position at any point would probably involve the retreat of the whole of their troops. The piercing of a front in a mountain region is a more serious matter than a similar break in the case where troops are fighting on ordinary undulating country ; in the former case the extreme difficulties of lateral movement render it almost impossible to repair, by force of arms, the disaster of a break in the line ; such however is not generally the case when fighting in the plains.

During the month of May, the Austrians made violent efforts to retake the Vodice, and on the 28th May were temporarily in possession of their objective, but had finally to withdraw. Subsequent attacks by the Austrians in this position shared a similar fate and, in consequence, the Italians were left masters of the region in front of the Bansizza plateau and in close proximity to M. Santo and M. San Gabriele.

The failure of their offensives in the north stimulated the Austrians to try their luck on another part of the front. During the first days of June, therefore, the Austrians got ready for a counter-offensive on the Carso. The Italians took note of this and made preparations to beat off their opponents.

On the 3rd June the Austrian artillery opened a perfect hurricane of fire on the Italian positions extending from Hermada to S. Marco. The situation is an easy as well as a difficult one to describe. Easy where the peculiarities of the features of the Carso are familiar to those addressed ; difficult where the accidented and wooded nature of this region cannot be pictured in the mind by those addressed.

Bombardments and reconnaissances by patrols alternated until the following day (4th June) when the Austrians launched their attack.

The situation was a critical one for the Italians for a few hours ; had the *morale* of their troops broken down, they would have lost all the advantages obtained by their arduous labours of preceding days. Had the Italian front been pierced at any point, say Castagnavizza or Jamiano, this would have involved the withdrawal of the whole of the Italian troops on to the position on the Isonzo, whence they had originally advanced. They however held on to their positions. In spite of the heavy attacks made on the Italian salient at Faiti and in the neighbourhood of Brestovizza, no ground was yielded on these parts of the front ; however, further south, near Flondar, the Austrians managed to drive the Italians back a few hundred yards. This small Austrian success did not materially effect the general situation ; the Italians continued to cover and to hold the entire region of the Vallone and of Monfalcone, with their right resting on the sea. It would appear that a War correspondent in an article contributed to the *Basler Nachrichten* of the 16th June, 1917, looks upon the Austrian counter-offensive on this occasion as having been a success. The author of the *Revue* article, however, contests this view and points out that in order to have been an entire success the Austrian counter-offensive ought to have driven the Italians back on to Isonzo and to have carried the Austrians to the Vallone.

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In the case of operations on a widely extended front correct strategy requires a co-ordination of effort along the whole of that front during the progress of an attack on some particular portion thereof. The author of the original article is of opinion that the Italians were guilty of an error in not attacking in the High Alps simultaneously with the launching of their offensive on the Carso, so as to prevent the transfer of Austrian troops from one part of the front to another.

The battle had scarcely died down on the Carso, when the artillery began to belch forth on the high plateau of the Seven Communes, in the region of Arsiero and of Asiago, the scene of the Austrian offensive of 1916.

The Austrians had, since 1916, remained in occupation of Italian territory N. of the Asiago Conch which acted as a kind of spring-board to help them to get on to the plateau of the Seven Communes.

The Austrian left rested on the chain of hills which separated the watershed of the Nos. Valley from that of the Galmarara. The Mont Ortigara (6,900 ft.) situated at the end of the chain constituted the junction between the retrenchments of the high plateau and those of the Val Sugana. It was attacked by the Italians on the 10th June and finally carried by them; on the 13th *idem* the Austrians had commenced a series of powerful counter-attacks and the issue was in doubt for some time; success and failure had alternated on the two sides for some time.

On the remainder of the front considerable activity existed. Italians and Austrians came to grips in the positions at Colbricon, the Trois Cimes, on the Zugna, on the Lagazuoi, on the Adamello and elsewhere; the actions which took place were only of local importance and had no influence on the general situation. The region of the Carso and the plateau of Bansizza continued to be the points of primary importance.

In the spring of 1917 a period of active operations was again expected. The Italians credited the Austrians with the intention of assuming the offensive in the Trentino; but this did not come off.

It was the Italian Army which started the ball rolling this time, by launching an attack on the Carso. Volumes would have to be written to describe the various episodes which took place. One of the remarkable things in the Italian theatre is the enormous amount of engineering work that has been done in the mountain regions. A great part of this will be a net gain after the War; it will render habitable a region which formerly was tenantless or nearly so.

A Trench Raid.

The materials for the *Revue* article were, it is stated, obtained from an account of the episode in question contributed by an American eye-witness to the *Infantry Journal* for June, 1917.

Objective.—The raid was undertaken by French troops for the purpose of taking prisoners in order to ascertain what German formations and units were holding certain positions. The French and German trenches were about 50 yards apart at the point selected for the raid.

Preparations.—A scheme for securing the ends in view was prepared by the Regimental Commander whose troops were to carry out the raid;

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it provided for the sudden outburst of extremely violent artillery fire against a salient in the German line, so as to form a " curtain " in its rear and on its flanks with the object of isolating the German troops holding it ; an infantry detachment, about one hundred strong, was subsequently to issue from its trenches for the purpose of entering the salient in question and of bringing back prisoners. The Divisional Commander having approved the scheme, a system of trenches was constructed, the trace of which was a replica of the salient in the German line (based on aerial photographs), in rear of the French lines and the infantry detachment detailed for the raid practised for some days the execution of the task allotted to it, until every man was familiar with his exact duty on the appointed day. A sketch is given in the original article showing, in outline, the French and German trenches in the neighbourhood of the point of attack.

The French raiding party was divided into four groups :—

(*a*). The *first group* consisted of 1 officer and 18 other ranks ; their task was to enter the German first line trenches and to push patrols along these trenches in order to block them off on the left flank of the raiding party.

(*b*). The *second group* consisted of 2 officers and 37 other ranks ; their task was to advance to the German second line trenches, and to clean up the third line trenches and those extending to the right ; in the case of the latter they were to push out to a distance of at least 60 yards from the communication trench allotted to them.

(*c*). The *third group* consisted of 1 officer and 16 other ranks ; their task was to clean up the German second line and maintain connection between the left and right groups ((*a*) and (*b*) above) and to cover their withdrawal.

(*d*). The *fourth group* consisted of 1 warrant officer and 39 other ranks ; their task was to remain in the French trenches and to act as a support in case of need.

The Company Commander told off to direct the raid was to remain with the *fourth group*. It was arranged that as soon as any German prisoners had actually reached the French trenches he should send up a signal light to recall the remainder of the raiding party.

Artillery.—The French had installed 12 mine-throwers (throwing 90-lb. projectiles) in two groups of six each ; these were placed 200 and 300 yards respectively in rear of the French first line trench. The left group was ordered to make a breach in the enemy's entanglements at a point where it was nearest to the French trenches ; the right group was ordered to make a second trench in the entanglements some 450 yards to the right of the one referred to earlier.

In addition to the mine-throwers, 6 batteries of " 75 " guns and 3 batteries of 6-in. howitzers were also brought into action.

Two aeroplanes were employed, one for the purpose of " spotting " the fire of the French Artillery and the other for keeping the Divisional Commander in touch with the progress of events. Both of these machines came under the fire of the German A.A. guns, but they continued to carry out their duties.

Execution.—The artillery was ordered to open fire at 3.30 p.m. A few

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minutes before the infantry were to go over the "top," they were inspected by their C.O. Each man wore a white brassard and carried two smoke grenades; the numbers and distinctive marks were removed from their uniforms, they wore no great coats and all papers were removed from their person which would give any information whatever to the enemy.

The observing officer took up a position in a look-out post some 350 to 400 yards from the enemy's first line trench; the O.C. mine-throwers occupied the same post.

Guns, howitzers and mine-throwers came simultaneously into action at 3.40 p.m.; the guns putting up a "curtain" 100 yards in rear of and on the flanks of the German salient to be attacked; the howitzers directed their fire against the German batteries and machine guns and the mine-throwers set to work to destroy the entanglements. The attack was a complete surprise to the Germans; they do not appear to have located the position of the French mine-throwers. The German artillery replied, doing some damage to the French first line trenches.

By 4.40 p.m. the French mine-throwers had succeeded in cutting the German entanglements and at 5.10 p.m. turned their fire against the enemy's first line trenches and particularly against the flanks of the salient.

Orders were given for the infantry detachment to go forward at 5.20 p.m. At the hour mentioned the "curtain" of the "75" guns in rear of the salient was carried further, by 150 yards, to the rear; the German position was now surrounded by a box-barrage. The howitzers remained in action. At 5.22 p.m. the infantry detachment advanced from their trenches, a few of the men only doubled, the others simply quickened their pace. The German first and second lines were entered, but not the third line. Three unwounded Germans were taken prisoners and conducted back to the French lines. On the way back, a German machine gun opened fire on the prisoners and their guard from a hidden position on the latter's left, but no one was hit. The German prisoners being safely back in the French trenches at 5.28 p.m., the signal light was sent up for the return of the raiding party; by 5.33 p.m. they were all safely back again; smoke grenades were used to cover the withdrawal. At 5.35 p.m., a second light was sent up to let the French artillery know that the infantry had returned from the German trenches.

Counter Measures.—At 5.25 p m., the Germans sent up a red-and-green light as a signal for their artillery to put up a barrage. The German artillery responded to this request at 5.35 p.m., *i.e.* a few minutes after the last of the French soldiers had got back into their lines. The German barrage formed a very dense curtain between the German and French first lines; 6-in. howitzers were used for the purpose.

Conclusion.—During this raid the French mine-throwers fired 1,212 rounds; the "75" guns 6,340 rounds; the howitzers 1,690 rounds.

The raid was considered to have been a complete success.

The report of the Divisional Commander on the raid, it is stated, concludes with the following observations:—

(*a*). In order to provide for the success of such a raid the troops to take part therein should receive a week's special training in a locality

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the features of which correspond as nearly as possible to those in which the enemy's trench system to be raided are situated.

(*b*). The closest co-operation between the artillery, infantry and flying corps is of the highest importance.

(*c*). In an enterprise of such short duration, it is difficult to get the prisoners away from their shelters.

(*d*). Machine guns should be placed at some point wide of the flanks so as to be as far as possible out of the way of the positions which the enemy's artillery are likely to make their principal target.

(*e*). Infantry taking part in such enterprises should carry their gas-helmets slung in the 'Alert' position.

(*f*). The support of their own artillery is of considerable moral value and gives the infantry the necessary confidence to enter the enemy's trenches and to bring back prisoners without suffering any casualties.

Notes and News.

Switzerland.—The death is announced of Colonel Treytorrens de Loys, a Divisional Commander. An outline of his career is given in the *Revue*. The deceased officer began his career in the cavalry and was for some time on the Instructional Staff of the Swiss Cavalry; in 1895 he became a Professor at the Senior Officers' Central School. He had a high reputation as a teacher. Colonel de Loys was also an occasional contributor of articles on tactical subjects to the *Revue Militaire Suisse*. He was devoted to his profession and put its interests before all things else.

Belgium.—A special contributor points out that the calling of a military correspondent is in these days a very trying one. Events follow one another with amazing rapidity, but the announcements concerning them are delayed and sometimes skimmed of their cream.

It is stated that Belgium, like France and Spain, has also had its Ministerial Crisis. Baron de Broqueville suddenly resigned his portfolio as War Minister to take over that of the Belgian Foreign Office; this event naturally gave rise to speculations on the part of the public.

The military situation in 1912, when Baron de Broqueville entered on his duties as War Minister, was deplorable. He, at once, set himself the task of bringing about the necessary reforms and although he met with much opposition, yet by degrees, he brushed all obstacles aside. Finally, he succeeded in getting the new Military Law passed which provided for increased establishments in the Belgian Army. Baron de Broqueville exercised a most wholesome influence and it was largely due to him that the Belgian Army was as well prepared as the German Army found it to be in August, 1914. Lieut.-General de Ceuninck who has succeeded to the post of War Minister has for some months past been in command of the 6th Belgian Division; he has a reputation for great energy, remarkable endurance and great personal bravery. He is moreover a strict disciplinarian and the question is asked whether he is by temperament suited for a political office. The appointment of General de Ceuninck to the charge of the War Ministry has revived in Belgium the discussion on the familiar topic whether a soldier or a layman should have political control of the destinies of an

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army. As in many other mundane affairs it does not seem possible for the opinions of the public of any nation to be unanimous on this subject. Whether a soldier or a civilian is the proper person to have charge of a Ministry of War is a question which it is futile to discuss in the abstract; the personality of the supreme head of a Government Department is the factor which counts most from the point of view of a nation's interests and not that of the particular profession or calling in which he may have been brought up.

At the same time that the change in the constitution of the Belgian Cabinet took place, a War Committee was formed. This Committee is composed of five Ministers with portfolios, one without and the Belgian Minister at the Court of St. James; the War Minister is not serving on the Committee.

The suggestion is thrown out that Belgium, in view of the size of its mercantile marine and of the extent of the Belgian Congo, should possess a Navy of its own. It is one of the questions that will have to be dealt with in connection with the reconstruction of the Kingdom after the War.

Although Belgium has not, in the present War, acquired a military status on the deep waters, many of her sons have, on the other hand, participated in the brilliant feats in which the Western Allies have played a part for securing military supremacy in the air.

INFORMATION.

The death is announced of Lieut.-Colonel Eugene Vicarino, commanding the 38th Infantry Regiment at Friburg, from wounds received at bombing practice.

This number of the *Revue* concludes with a bibliography containing brief notices of books of military interest. A list is also given of some works recently received for review.

W. A. J. O'MEARA.

RIVISTA DI ARTIGLIERIA E GENIO.

July—August, 1917.

TACTICAL USE OF CAPTIVE BALLOONS.

Characteristics of Captive Balloons.—Captive balloons firstly permit of the observing of the ground being superior in elevation to the ordinary terrestrial observers; secondly, there is a permanent telephonic communication between the cars and the earth; thirdly, they can remain from hour to hour in the air in the same position and can be conveyed by carriages to positions more convenient for the observation of determined points of the ground. They may then be used (*a*) as observers for the artillery; (*b*) for tactical observation.

Employment of Captive Balloons for Artillery Observation.—Given the range of modern artillery of medium and large calibre over level and hilly ground observations on the ground are not sufficient for ordinary operations. Captive balloons also have an advantage over aeroplanes

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in being able to hold telephonic communication with the artillery command. During the adjustment of the artillery fire they can signal the shots in the target zone, without causing confusion to the shots from other batteries. It is necessary that the observer should know (*a*) the precise position of the pieces that fire; (*b*) the colour of the smoke of the projectiles. After observing the arrival of the shots in the zone of the targets the observer communicates the direction—left, or right—and the range—short, or long—with regard to the line that joins the balloon with the target. It is useful that the commanders of artillery detachments should make ascents in balloons so as to determine the zone assigned to their own guns and to settle the duties for the captive balloons.

Employment of Captive Balloons for Tactical Observations.—Captive balloons can be useful for these in the following cases:—(*a*) To give notice of the movement of troops and transport within the zone of surveillance; (*b*) to individualize batteries and the enemy's guns; (*c*) to signal the nature of the enemy's fortifications including the trenches, barbed wire, new positions, observatories, etc.; (*d*) to observe the direction of the ordinary roads and railways which may not have been marked on the topographical maps, or of those under construction; (*e*) to observe barracks under construction. (*a*). The movements of troops and transport may be inferred from the dust thrown up by the auto-cars; if it is low and persistent it may be argued that it is caused by the movement of troops on foot; if still low and rapid it may be from cavalry or carriages, if high and moving swiftly it may be from automobiles. (*b*). To distinguish separately batteries or the enemy's guns special attention must be paid to the shots on arrival, and to the general direction of the enemy's forces, and the zone from which the fire is directed. When the conditions of visibility are favourable it is possible to discover the flashes from the guns, and with the special knowledge of the ground by the observers they can at once mark the spots on a topographical map and communicate with the ground. (*c*). The observations of the enemy's fortifications should constitute one of the most important duties of captive balloon observers. The observer should follow daily the progress of the enemy's fortifications; the construction of concealed positions and observatories, trenches, barbed wire, and other obstacles; the advance of our troops; the masking of the roads; the explosions of mines that reveal the construction of trenches and roads. All the above should be marked on a topographical map and should be communicated daily to the command of the great unit to which is extended the aerostatic sections. (*d*) (*e*). For observing the roads not yet reported on the maps, and the works in progress for the construction of barracks. For the employment of balloons for tactical observations the approach should be made as near as possible to the enemy's lines with the manœuvring car. The approach should be within a limit of six kilometres, nearer than this it is not possible to remain in observation on account of anti-aerial artillery. The advantages in the case of observing from balloons from a height over aeroplanes are the following:—Firstly, the possibility for the observer to fix his attention continually

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on the points of tactical importance, roads, bridges, camps, etc.; secondly, the possibility of signalling immediately to the ground movements of troops and transport, etc., and for directing the artillery fire; thirdly, in localities in which the ground is densely wooded it is not always possible for aeroplanes to discover movements, for on sight of the aeroplane there is generally time to conceal under cover the troops and wagons; with the continual observations that can be made from the stationary balloon on the glades and roads that traverse the localities and ground thickly covered, movements of troops and carriages can be seen which were not revealed to the observers in aeroplanes. To be able to carry out such duties with security it is necessary that the balloon should be escorted and guarded during the manœuvre of approach by one or two aeroplanes which should fly at about 1,000 metres above the balloon. The balloon should rise as high as is compatible with safety from the enemy's artillery—from 1,000 to 2,000 metres.

Rules for the Employment of Captive Balloons.—The Drake balloon of about 1,000 m.—capable of ascending to 2,000 m. may be usefully employed. It should be assigned to a great unit with its balloon section composed of the material and personnel. The personnel for a Drake balloon should be taken (*a*) from the artillery command as observer for artillery; (*b*) from the command of the great unit or tactical observer. The duties of an artillery observer in a Drake balloon are to mark and adjust the ranges in the zone visible from the balloon but not visible to the observers on the ground. It is necessary that the aerostatic station should be connected telephonically with the central telephones of the various groups so as to be able by this means to have direct communication with the commanders of the batteries. In addition to this the artillery commander should assign to the aerostatic station one or more batteries who should adhere to the requirements on the zone in which the observer specially notes movements of troops, or transport, flashes from the enemy's guns which molest the fire from our lines, the construction of fortified works, roads, barracks and manœuvres of the enemy's aerostats on the ground, etc. The commander of the great units, armies, army corps, and divisions should assign to the Drake balloons duties of tactical exploration especially during the devolution of the operations. It is indispensable that the aerostatic sections should be constantly informed on the situation and on the phases of the strife so as to be able to draw useful consequences from their aerial observation and not be under false interpretations. The natural enemies of aerial observation are strong winds;—that is more than 10 metres, or gusts from various directions—electrical discharges, rain and mist. In the employment of balloons, as in all kinds of aerial methods, it should be well considered by the command, whether the risk corresponds with the utility of the operation.

Commanders of aerostatic sections should not be called upon to make ascents in foggy weather, or under unfavourable conditions of visibility, during which the observer is unable to make any useful observations, and the aerostat merely becomes a mark of reference for the enemy.

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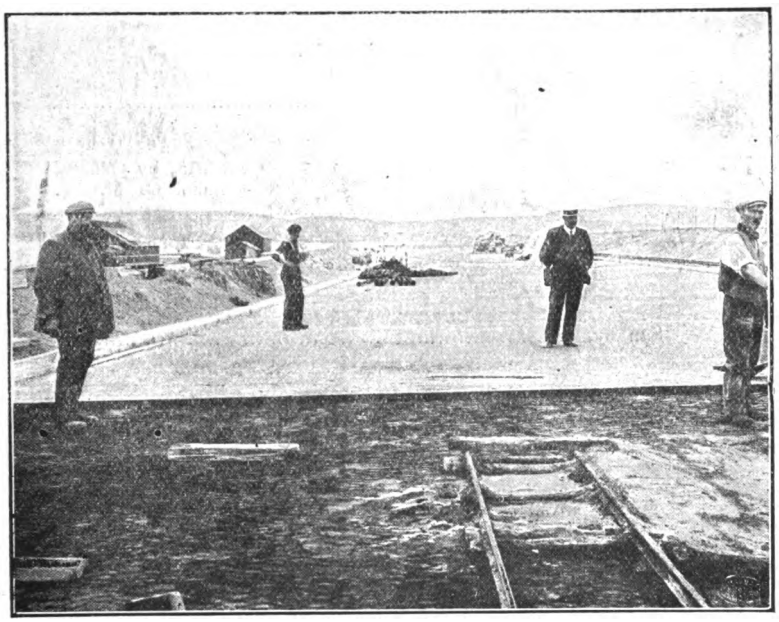

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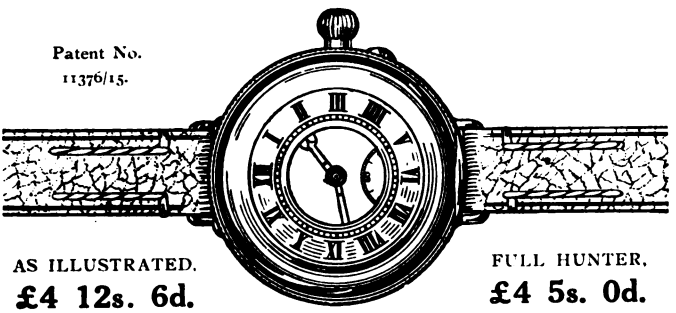

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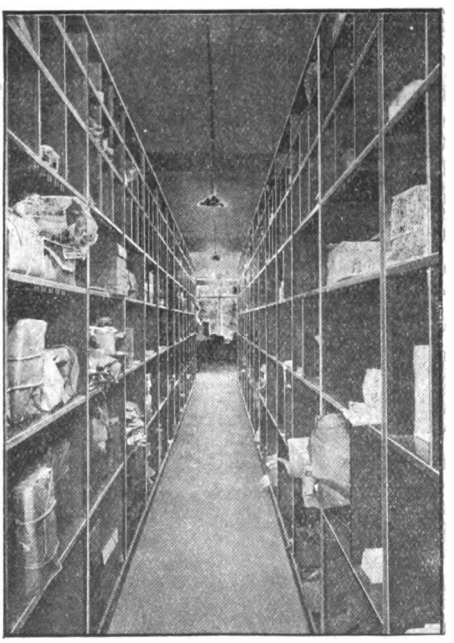

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MILITARY BRIDGES.

SOME NOTES ON THE DISTRIBUTION OF HEAVY LOADS.

By LIEUT. W. N. THOMAS, R.E.

IN order to design a bridge, the decking of which is carried by several girders, it is obviously not sufficient merely to know the *average* load borne by each girder, but it is necessary to determine—at any rate approximately—the maximum proportion of the total load to which any particular girder may be subjected.

It is frequently stated in text-books that the distribution of the main load on to the supporting girders depends upon the relative stiffnesses of the decking and of the girders, and these stiffnesses are dependent upon—

(*a*). The value of E for the material of which the decking is composed.

(*b*). The value of E for the material of which the girders are composed.

(*c*). The moment of inertia of the decking cross-sectional area.

(*d*). The moment of inertia of the girder cross-sectional area.

(*e*). The span of the main girders, their distance apart, and the methods by which their ends are fixed or supported.

(*f*). The initial distribution of the load on the decking, and the manner in which this load is transferred on to the main girders, are also factors which affect the final distribution.

The unevenness of the distribution under ordinary conditions is not however very generally appreciated, and hence it has been thought worth while to give in the following a few curves and calculations to show how the proportion of the total load brought on to each girder varies with varying conditions, and to indicate to some extent the magnitude of this variation.

There are so many variables which affect the distribution of the load on to the main girders, that it would be too complex to attempt a perfectly general solution, and consequently the investigations have been confined to the case of a road bridge, 10 ft. wide between the ribbands, to carry the 6-in. gun. This gives a live load of 17 tons on two wheels, each of which is 20 in. wide, and the wheel base measures 9 ft. from outside to outside of tyres.

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If a live load factor of $1\frac{1}{2}$ be adopted, the equivalent dead load on each wheel is 12·75 tons, and the calculations have been based on this figure. If a live load factor of 2 be adopted, the results are all increased in the ratio of $1\frac{1}{2}:2$.

Two particular positions of the gun relative to the central axis of the bridge have been considered—(1), when the gun is in the centre of the roadway, and the loading is consequently symmetrical; and (2) when one wheel of the gun is on the edge of the roadway, *i.e.* close up against the ribband. *Figs.* 1 and 2 show these two cases.

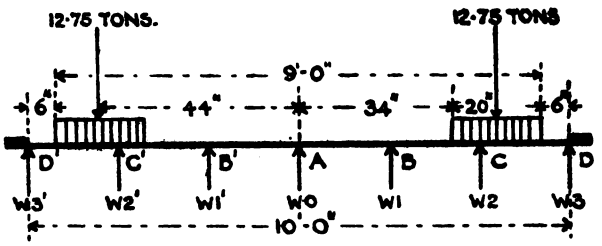

FIG. 1.

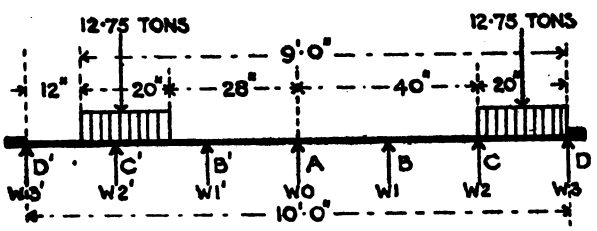

FIG. 2.

The following example dealing with a bridge having seven main girders, and carrying the gun in the eccentric position (*Fig.* 2) will now be taken to illustrate the method of calculating the reactions on the different girders.

The total live load, as already stated, is 17 tons, giving an equivalent dead load of 25·5 tons on the two wheels, or 12·75 tons on each wheel of 20-in. width.

The first step is to obtain, by means of the equations given in the Appendix, an expression for the deflection of B below A, by considering the strip of decking which is carrying the two wheel loads, and so causing the reactions w_3', w_2', w_1', w_0, w_1, w_2, and w_3 on the main girders.

It is convenient to assume this deflection as the algebraic sum of the separate deflections caused by each of the individual forces acting on the decking either to the right or to the left of A.

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Thus if the forces to the right of A are taken, there are four separate deflections, viz. :—

(i.) That due to the reaction w_1 upwards.
(ii.) „ „ w_2 „
(iii.) „ „ w_3 „
(iv.) „ to the wheel load 12·75 tons downwards, and in addition must be considered
(v.) „ to the slope of the beam at A, assumed positive downwards to the right.

Calculating these partial deflections separately we have—

(i.) From Equation 5 in Appendix

$$EI\delta_1 = w_1 \frac{20^3}{3} = 2{,}666{\cdot}6\dot{w}_1.$$

(ii.) From Equation 4

$$EI\delta_2 = w_2 \left\{ \frac{40 \cdot 20^2}{2} - \frac{20^3}{6} \right\} = 6{,}666{\cdot}6\dot{w}_2.$$

(iii.) From Equation 4

$$EI\delta_3 = w_3 \left\{ \frac{60 \cdot 20^2}{2} - \frac{20^3}{6} \right\} = 10{,}666{\cdot}6\dot{w}_3.$$

(iv.) From Equation 1

$$EI\delta_4 = 12{\cdot}75 \left\{ \frac{50 \cdot 20^2}{2} - \frac{20^3}{6} \right\} = 110{,}500.$$

(v.) $$EI\delta_5 = i_A \cdot 20 \cdot EI.$$

The total deflection of B below A may therefore be written as

$$\delta = \frac{1000}{EI} \left\{ 110{\cdot}5 - 2{\cdot}6\dot{w}_1 - 6{\cdot}6\dot{w}_2 - 10{\cdot}6\dot{w}_3 + {\cdot}02 i_A EI \right\}.$$

Similar expressions for these partial deflections at the points C, D, B′, C′, D′, are tabulated in Table I. and reduced in Table II.

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TABLE I.

EIδ at	Due to $\frac{W}{2}$ (downwards).	w_1 or w_1' (upwards).	w_2 or w_2' (upwards).	w_3 or w_3' (upwards).	i_A (downwards).
B	$12{\cdot}75\left\{50\cdot\frac{20^2}{2}-\frac{20^3}{6}\right\}$	$\frac{w_1 20^3}{3}$	$w_2\left(\frac{40\cdot 20^2}{2}-\frac{20^3}{6}\right)$	$w_3\left(\frac{60\cdot 20^2}{2}-\frac{20^3}{6}\right)$	$20 i_A EI$
C	$12{\cdot}75\left\{\frac{50\cdot 40^2}{2}-\frac{40^3}{6}\right\}$	$w_1\left(\frac{20^3}{3}+\frac{20^2\cdot 20}{2}\right)$	$\frac{w_2 40^3}{3}$	$w_3\left(\frac{60\cdot 40^2}{2}-\frac{40^3}{6}\right)$	$40\cdot i_A EI$
D	$12{\cdot}75\left\{\frac{20^3}{8}+\frac{3\cdot 40^2\cdot 20}{4}+\frac{40\cdot 20^2}{2}+\frac{40^3}{3}\right\}$	$w_1\left(\frac{20^3}{3}+\frac{20^2\cdot 40}{2}\right)$	$w_2\left(\frac{40^3}{3}+\frac{40^2\cdot 20}{2}\right)$	$\frac{w_3\cdot 60^3}{3}$	$60\cdot i_A EI$
B′	$12{\cdot}75\left\{\frac{38\cdot 20^2}{2}-\frac{20^3}{6}\right\}$	$\frac{w_1' 20^3}{3}$	$w_2'\left(\frac{40\cdot 20^2}{2}-\frac{20^3}{6}\right)$	$w_3'\left(\frac{60\cdot 20^2}{2}-\frac{20^3}{6}\right)$	$-20 i_A EI$
C′	$12{\cdot}75\left\{\frac{20\cdot 12^2}{4}-\frac{12^3}{6}+\frac{12^4}{24\cdot 20}+\frac{28^2\cdot 12}{2}+\frac{28\cdot 12\cdot 20}{2}+\frac{28^2\cdot 20}{4}+\frac{28^3}{3}\right\}$	$w_1'\left(\frac{20^3}{3}+\frac{20^2\cdot 20}{2}\right)$	$\frac{w_2'\cdot 40^3}{3}$	$w_3'\left(\frac{60\cdot 40^2}{2}-\frac{40^3}{6}\right)$	$-40 i_A EI$
D′	$12{\cdot}75\left\{\left(\frac{20^3}{8}+\frac{3\cdot 28^2\cdot 20}{4}+\frac{28\cdot 20^2}{2}+\frac{28^3}{3}\right)+\left(\frac{20^2}{6}+\frac{28\cdot 20}{2}+\frac{28^2}{2}\right)12\right\}$	$w_1'\left(\frac{20^3}{3}+\frac{20^2\cdot 40}{2}\right)$	$w_2'\left(\frac{40^3}{3}+\frac{40^2\cdot 20}{2}\right)$	$\frac{w_3'\cdot 60^3}{3}$	$-60 i_A EI$

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TABLE II.

$\frac{EIc}{1000}$ at	Due to $\frac{W}{2}$ (downwards).	w_1 or w_1' (upwards).	w_2 or w_2' (upwards).	w_3 or w_3' (upwards).	i_A (downwards).
B	110·5	$2\cdot\dot{6}w_1$	$6\cdot\dot{6}w_2$	$10\cdot\dot{6}w_3$	$\cdot02i_AEI$
C	374	$6\cdot\dot{6}w_1$	$21\cdot\dot{3}w_2$	$37\cdot\dot{3}w_3$	$\cdot04i_AEI$
D	692·75	$10\cdot\dot{6}w_1$	$37\cdot\dot{3}w_2$	$72w_3$	$\cdot06i_AEI$
B′	79·9	$2\cdot\dot{6}w_1'$	$6\cdot\dot{6}w_2'$	$10\cdot\dot{6}w_3'$	$-\cdot02i_AEI$
C′	252·144	$6\cdot\dot{6}w_1'$	$21\cdot\dot{3}w_2'$	$37\cdot\dot{3}w_3'$	$-\cdot04i_AEI$
D′	440·397	$10\cdot\dot{6}w_1'$	$37\cdot\dot{3}w_2'$	$72w_3'$	$-\cdot06i_AEI$

But an expression for the deflection of B below A may also be obtained by considering the deflections of the main girders due to w_1 and w_0 respectively, when the difference gives the deflection of B below A.

Thus
$$\delta = K \cdot \frac{w_1 L^3}{E_1 I_1} - K \frac{w_0 L^3}{E_1 I_1}$$
$$= \frac{KL^3}{E_1 I_1}(w_1 - w_0)$$

where K is a constant depending

(i.). Upon the distribution of the loads w_0, w_1, etc., upon the main girders, *i.e.*, whether concentrated or distributed evenly or unevenly on the whole or part of the span.

(ii.). Upon the distance of the loads w_0, w_1...from the abutments of the bridge, *i.e.*, whether central on the main girders or otherwise (K may thus have a slightly different value for each girder of a skew bridge if the decking is laid at right angles to the girders).

(iii.). Whether the ends of the girders are simply supported, or built in.

Thus, assuming K, E_1, I_1 and L to be the same for all the girders, we get, by equating these two expressions for the deflection of B below A—

$$\frac{KL^3}{E_1 I_1}(w_1 - w_0) = \frac{1000}{EI}\{110\cdot5 - 2\cdot\dot{6}w_1 - 6\cdot\dot{6}w_2 - 10\cdot\dot{6}w_3 + \cdot02i_AEI\}$$

or
$$\frac{c}{1000}(w_1 - w_0) = 110\cdot5 - 2\cdot\dot{6}w_1 - 6\cdot\dot{6}w_2 - 10\cdot\dot{6}w_3 + \cdot02i_AEI \ldots (1),$$

where
$$c = \frac{KL^3EI}{E_1 I_1}.$$

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Similarly by equating the expressions for the deflections of C, D, B′, C′, D′, below A, we get

$$\frac{c}{1000}(w_2-w_0)=374-6\cdot6\dot{w}_1-21\cdot3\dot{w}_2-37\cdot3\dot{w}_3+\cdot04i_AEI \quad \ldots\ldots(2).$$

$$\frac{c}{1000}(w_3-w_0)=692\cdot75-10\cdot6\dot{w}_1-37\cdot3\dot{w}_2-72w_3+\cdot06i_AEI \quad \ldots\ldots(3).$$

$$\frac{c}{1000}(w_1'-w_0)=79\cdot9-2\cdot6\dot{w}_1-6\cdot6\dot{w}_2-10\cdot6\dot{w}_3-\cdot02i_AEI \quad \ldots\ldots(4).$$

$$\frac{c}{1000}(w_2'-w_0)=252\cdot144-6\cdot6\dot{w}_1'-21\cdot3\dot{w}_2'-37\cdot3\dot{w}_3'-\cdot04i_AEI \quad \ldots(5).$$

$$\frac{c}{1000}(w_3'-w_0)=440\cdot397-10\cdot6\dot{w}_1'-37\cdot3\dot{w}_2'-72w_3'-\cdot06i_AEI \quad \ldots(6).$$

There are now eight unknown quantities—w_0, w_1, w_2, w_3, w_1', w_2', w_3', and i_A, and it is necessary therefore to find two more equations before the values of these can be determined.

One equation may be obtained by making use of the fact that the Bending Moment at A (or at any other particular point along D′D) is the same whether loads to the right are considered or those to the left, *i.e.*,

$$20w_1+40w_2+60w_3-12\cdot75\times50=20w_1'+40w_2'+60w_3'-12\cdot75+38.$$

I.e. $$20(w_1-w_1')+40(w_2-w_2')+60(w_3-w_3')=12\cdot75\times12.$$

Or $$(w_1-w_1')+2(w_2-w_2')+3(w_3-w_3')=7\cdot65 \quad \ldots\ldots(7).$$

The eighth equation depends upon the fact that the algebraic sum of the reactions is equal to the total load, *i.e.*,

$$(w_1+w_1')+(w_2+w_2')+(w_3+w_3')+w_0=25\cdot5 \quad \ldots\ldots(8).$$

These eight equations may now be solved by the ordinary methods of algebra, and are sufficient to determine the eight unknowns for any particular value of c.

Thus if $c=1000$

$w_0 = \cdot03$ tons.
$w_1 = \cdot79$,,
$w_2 = 5\cdot57$,,
$w_3 = 6\cdot46$,,
$w_1' = 3\cdot66$,,
$w_2' = 7\cdot15$,,
$w_3' = 1\cdot90$,,

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If these values be determined for several values of c the curves as shown in *Fig.* 4 may be drawn.

When the load is symmetrically placed about the axis of the bridge (*Fig.* 1) the calculations are much simplified because

$$w_1 = w_1',$$
$$w_2 = w_2',$$
$$w_3 = w_3',$$
$$i_A = 0.$$

There are now only four unknowns, w_0, w_1 (or w_1'), w_3 (or w_2'), w_3 (or w_3'), and only the four equations (1), (2), (3), and (8) are necessary.

The curves given in *Fig.* 3 are therefore easily derived, and indicate

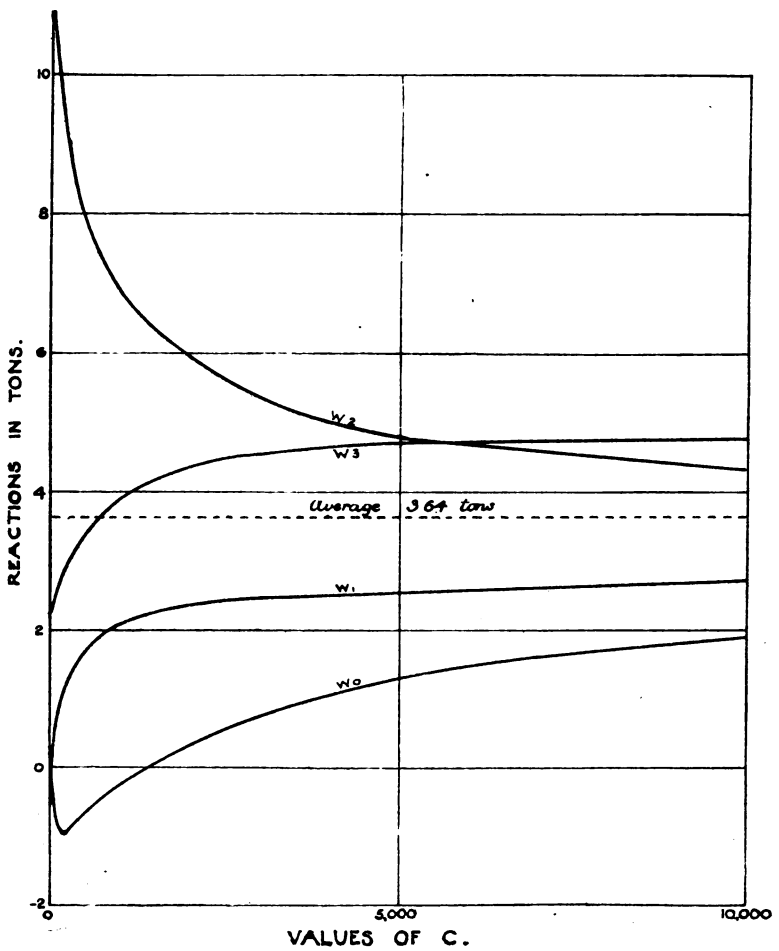

FIG. 3.—7 *Girders. Symmetrical Loading.*

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the values of the reactions on the girders for various values of c when the gun is in the centre of the roadway and when there are 7 girders.

Similar curves may be drawn for bridges having any other number of supporting girders, but owing to limitations of space more are not reproduced here.

Figs. 5 and 6, however, have been abstracted from such diagrams to show the *maximum* curves for several cases of symmetrical loading (*Fig.* 5) and for the same cases with eccentric loading (*Fig.* 6).

An examination of these diagrams (*Figs.* 3—6) shows how much in excess of the average one or more of the girders may be loaded, even when the load is in a symmetrical position.

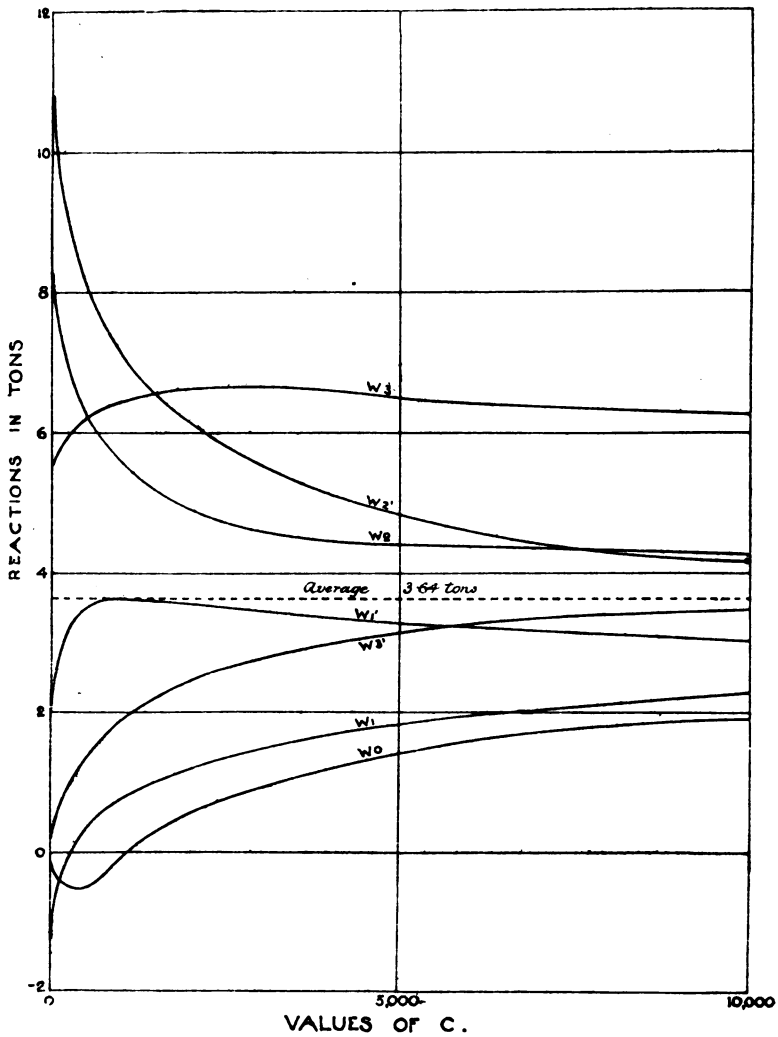

FIG. 4.—7 *Girders. Eccentric Loading.*

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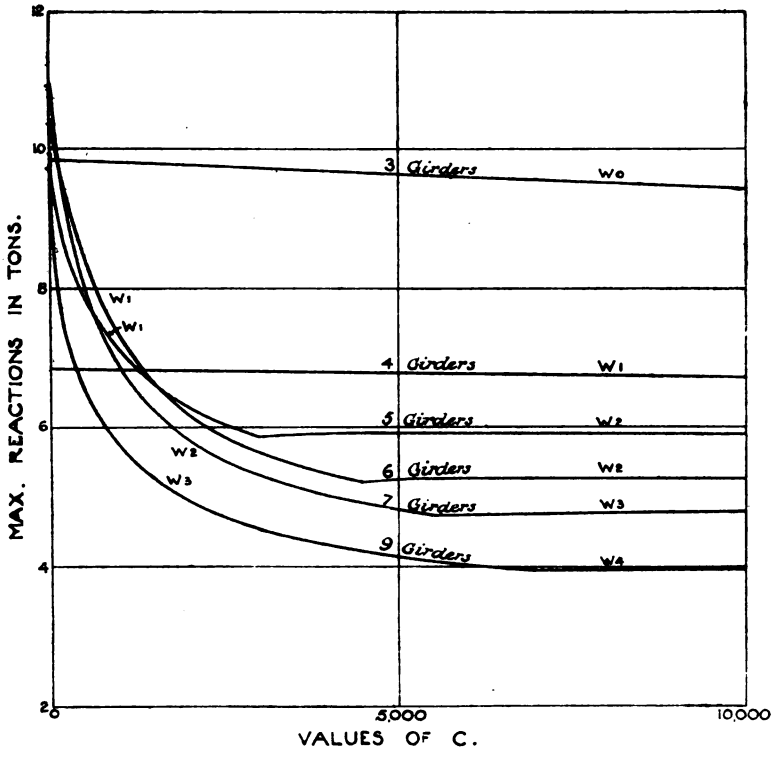

FIG. 5.—*Maximum Reactions on Girders. Symmetrical Loading.*

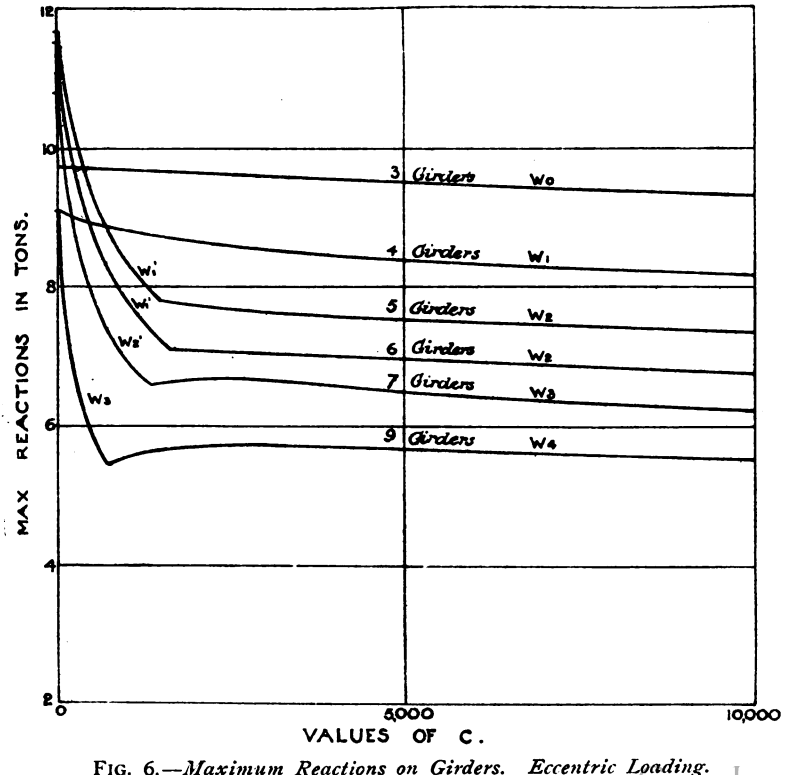

FIG. 6.—*Maximum Reactions on Girders. Eccentric Loading.*

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Fig. 7, which deals with the case of an eccentrically loaded bridge with 7 supporting girders, perhaps shows rather more clearly how uneven is the distribution, particularly when the stiffness of the decking is very low compared with that of the girders (*i.e.* when c has a very low value, as for instance at the abutments of the bridge, when, even with a very stiff decking the value of c would approximate to $c=o$).

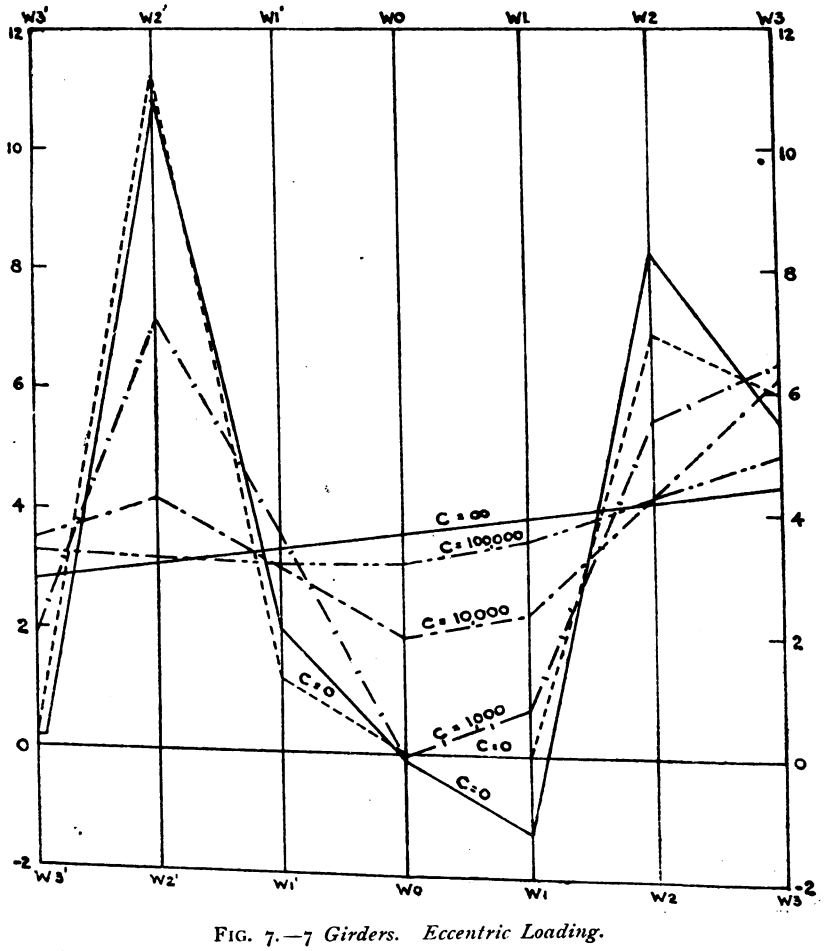

FIG. 7.—7 *Girders. Eccentric Loading.*

The distribution improves as c increases, and approaches a straight line limit when c becomes infinite, as shown by the unbroken line (*Fig.* 7), though the distribution is still very uneven for such high practical values of c as $c=5{,}000$ or $c=10{,}000$.

It is important that this fact should be recognized when determining the size of girders required.

It must be borne in mind, however, that the curves in *Figs.* 3—7

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are only for one set of conditions, viz. when the girders are equally spaced, and when the distance from centre to centre of the two extreme ones is 10 ft.

It is evident that the girders may be more widely spaced than this, or they may be unevenly spaced if necessary, and the distribution of the load on the various girders will be altered accordingly.

To illustrate this *Fig.* 8 has been drawn to show the maximum reaction curves for 3 cases of an eccentrically loaded bridge having 7 girders—

(i.) Equally spaced at 20″ centres.
(ii.) „ „ „ 21″ „
(iii.) „ „ „ 22″ „

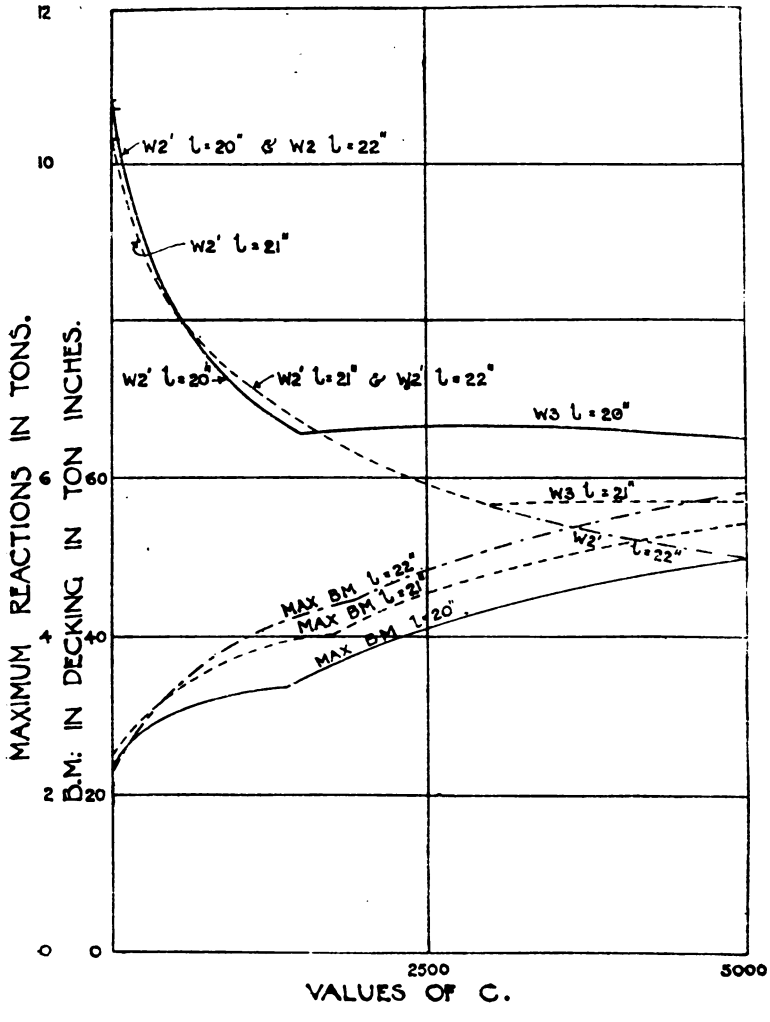

FIG. 8.—7 *Girders. Eccentrically Loaded*

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In this particular example, the maximum load brought on to a main girder is practically the same in each case, for values of c nearly up to 2,000.

Except for low values of c however, the increased spacing results in increased stresses in the decking as is shown by the lower curves of the figure. These show the maximum B.M.'s produced in the decking for the same distribution of the load and the same values of c as for the upper reaction curves.

Another point to which attention should be drawn is that when c has a low value, the results depend upon what assumptions are made as regards the *downward* pull that the girders are capable of exerting on the decking—*i.e.* the method by which the decking is secured, etc.

For instance when $c=0$ in the case of an eccentrically-loaded bridge containing 7 main girders (*e.g.* at the abutments) if the girders are capable of exerting a downward pull on the decking, the reactions are approximately

w_3'	w_2'	w_1'	w_0	w_1	w_2	w_3	
·20	10·80	2·03	−·09	−1·25	8·28	5·53	tons.

While if the girders are not considered capable of exerting any downward pull on the decking, the reactions are

w_3'	w_2'	w_1'	w_0	w_1	w_2	w_3	
·13	11·25	1·22	0	0	6·93	5·97	tons.

These values are shown in *Fig.* 7 by the two lines indicated $c=0$.

The Bending Moments on the decking for these two assumptions are easily calculated, and are respectively shown in Curves 3 and 4, *Fig.* 10.

Bending Moments in Main Girders.—When a girder is subjected to a travelling load of any description, the deflection of the girder varies with the position of the load upon the span.

An example of this is seen in Equation 8 in the Appendix, which gives an expression for the deflection of a simply supported girder, at a point immediately under a concentrated load W, when this is at a distance a from one abutment, and b from the other.

Thus if the deflection formula be written

$$\delta = K \cdot \frac{W \cdot L^3}{EI},$$

then

$$K = \frac{a^2 b^2}{3L^4},$$

i.e., a quantity which varies as a and b vary, and having values $K=\frac{1}{48}$ or ·02083 when the load is in the centre of the span—(*i.e.*, when $a=b=\frac{1}{2}L$), and $K=0$ when the load is over one of the abutments

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(*i.e.*, when either $a=0$ or $b=0$). A graph showing values of K for other values of a and b is given in *Fig.* 9.

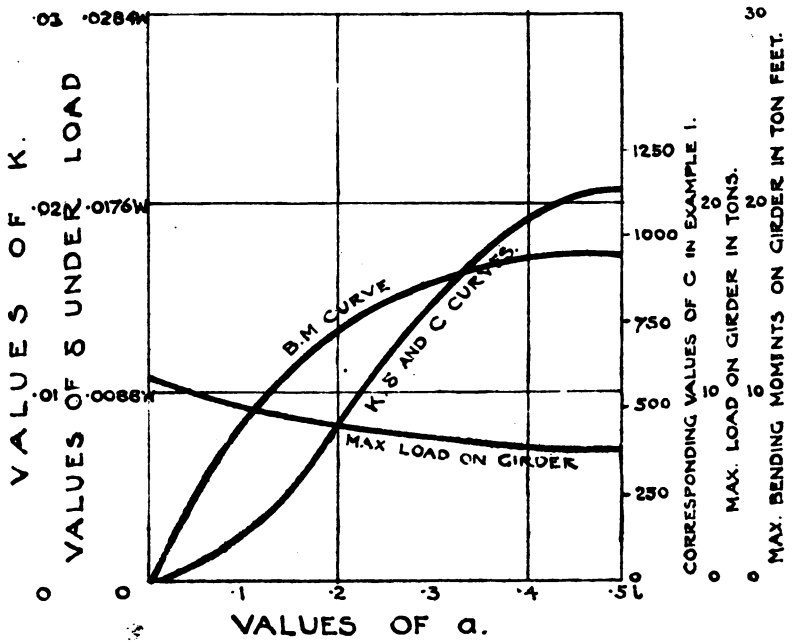

FIG. 9.

But c is proportional to K when L, E, I, E_1, and I_1 are constant, so that the K curve also represents c, but to a different scale, which scale depends upon the values of L, E, I, E_1, and I_1. For example in the case of 10 in. × 5 in. × 30 lbs. R.S.J. of 10-ft. span and 10-in. × 5-in. timber decking $c=1143$ when $K=\cdot02083$. This determines the scale for the c curve of this example, which may be drawn on the diagram as shown to enable any other values to be scaled direct. But, as has been shown in *Figs.* 3 to 8, the maximum load which is brought on to any one girder varies as the value of c varies: in general, since c decreases as the load travels from the centre of the bridge to the abutments, the maximum load brought on to any one girder is considerably increased as the abutments are approached.

The particular value of this maximum reaction for any particular position of the load on the span may be ascertained by

Firstly, noting the value of c on the curve in *Fig.* 9 which corresponds to this position of the load on the span, and

Secondly, noting the value of the maximum reaction from *Fig.* 6 which corresponds to this value of c—the bridge being eccentrically loaded.

Thus at ·3 of the span from one abutment, $K=\cdot0147$ $c=807$ and

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the maximum load on one girder of a 7-girder bridge is approximately 7·5 tons. Other points can be obtained in this way, and a maximum-load curve plotted as in *Fig.* 9, which refers to a 7-girder bridge eccentrically loaded.

It may be noted however that it is not necessarily the same girder which receives the maximum load at different positions of the load across the bridge, *e.g.*, in *Fig.* 4, for values of $c=0$ to about $c=1500$ w_2' receives the maximum load, while for values of c greater than $c=1500$, w_3 receives the maximum load.

Now, for any definite position of a concentrated load on a simply supported girder, the maximum B.M. occurs under the load, and the B.M. diagram is a triangle. Knowing then, the maximum load which comes on to a girder at any particular point, the B.M. due to that load at that point is easily calculated.

For example, at ·3 span, the load is approximately 7·5 tons, and the B.M. $=\frac{3\cdot7}{10}\times7\cdot5=15\cdot75$ ton-ft. By plotting values of this maximum B.M. for several points on the span, an influence line of maximum B.M. may be constructed as shown by the curve in *Fig.* 9.

The ordinate of this curve thus gives the maximum B.M. at any point along the girder when the load is at that particular point; and, as the curve has its maximum value at the centre of the span, the girder is evidently stressed most highly when the load is at the centre of the bridge, and it is sufficient to consider this point only when deciding what sizes of girder and decking to adopt.

Had the maximum load brought on to a girder remained constant, as the load travelled from the centre of the span to the abutments, this result would have been obvious since the influence line of maximum B.M. would then have been a parabola. In this case, however, with the varying load, the ordinates of the parabola are increased as shown, in proportion as the load increases, and it is therefore not evident at first sight, at which point on the span the main girders are subjected to the greatest B.M.

Bending Moments in Decking.—The bending moments in the decking are easily calculated when the reactions on the various girders are known, and as has been explained already these can be easily obtained for the case of 7 girders from *Figs.* 3 and 4 when c is known.

For example, Curve 1, *Fig.* 10, shows the B.M.'s in the decking when $c=1143$, a value which occurs at the centre of the span of a 7-girder bridge of 10-ft. span when the main girders are 10 in. × 5 in. × 30 lbs. R.S.J. and the decking is of 10-in. × 5-in. timber.

Similarly Curve 2 shows the B.M.'s when $c=500$—*i.e.*, at ·21 of the span from one abutment under the same conditions (see *Fig.* 9).

Curves 3 and 4 give the B.M.'s at the abutments when $c=0$ under the two assumptions mentioned previously in the paper.

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If the maximum values for a number of similar curves be abstracted, the results may be plotted to give a maximum B.M. curve for various values of *c*. Such curves are shown in *Figs.* 11 and 12 for bridges having different numbers of girders, both for symmetrical and for eccentric loading as in *Figs.* 1 and 2.

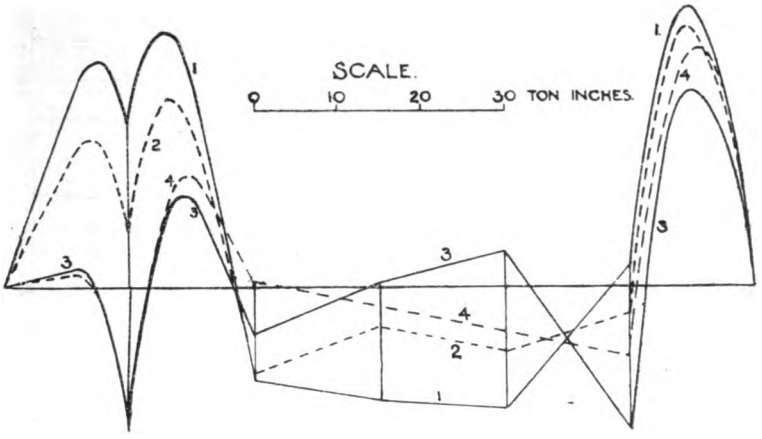

FIG. 10.—*B.M. Diagrams for Decking.*

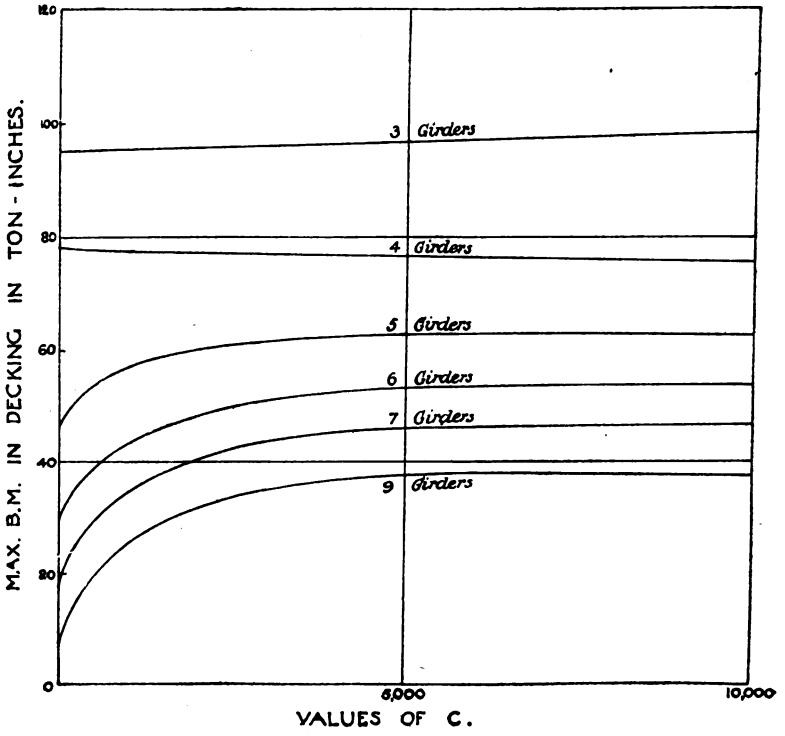

FIG. 11.—*Maximum Bending Moments in Decking Symmetrical Loading.*

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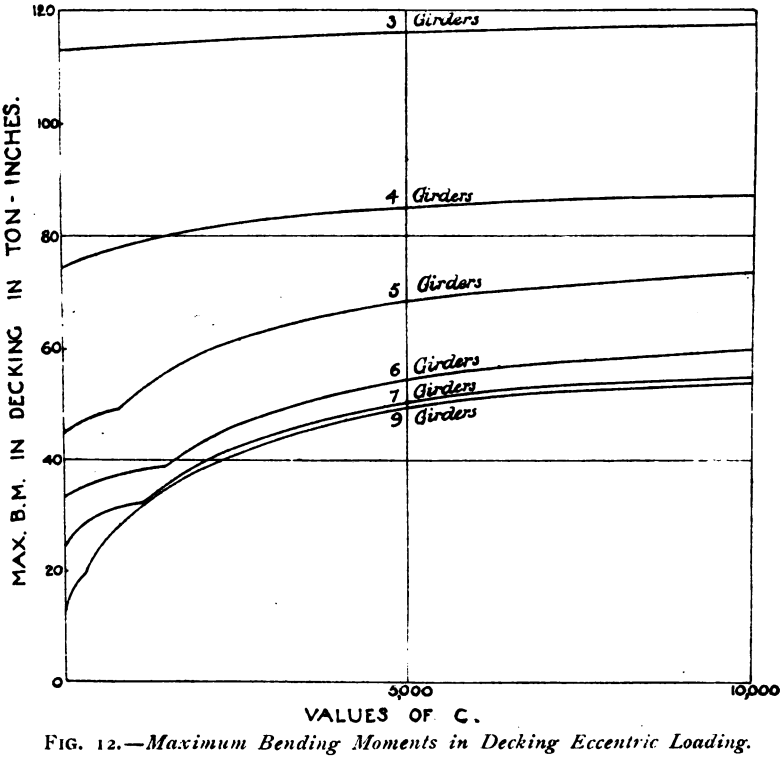

FIG. 12.—*Maximum Bending Moments in Decking Eccentric Loading.*

It will be seen from these that the value of the maximum B.M. increases as c increases, and hence in any particular case, the greatest value occurs when the load is at the centre of the span.

This is very convenient, as the maximum B.M. on the main girders also occurs when the load is in the centre of the span, as has been shown above.

Examples.—To show the application of the foregoing curves, a few concrete cases will be considered.

(i.). Suppose a bridge of 10-ft. span is required, and that 10 in. × 5 in. × 30 lb. R.S.J. are available for the main girders and 10-in. × 5-in. timbers for the decking.

The safe central dead load on a single girder at $7\frac{1}{2}$ tons per square inch stress = 7·28 tons ; and the moment of resistance of the decking is about 37·3 ton-inches, when the limiting stress is taken at 2,000 lbs. per square inch. An upper decking of $1\frac{1}{2}$-in. (say) timber should be provided to take the wear of the traffic, so that this stress is not excessive.

Reference to Table III. shows $\frac{KEI}{E_1I_1} = 6{\cdot}63$, and hence

$$c = 6{\cdot}63 \times 10^{-4} \times 120^3 = 1143 \text{ about.}$$

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On inspection of *Figs.* 5 and 6, it is seen that for this value of c, at least 7 girders are required to ensure that the maximum load on a girder shall not exceed 7·28 tons.

Similarly *Figs.* 11 and 12 show that for the B.M. in the decking not to exceed 37·3 ton-inches, at least 7 girders are required.

Hence the bridge should contain 7 main girders simply supported at their ends. This gives a maximum reaction of 6·8 tons—a figure which allows a margin for the extra stresses due to the dead load of the bridge—and a maximum B.M. of 36 ton-inches in the decking.

(ii.). For the same span of 10 ft., suppose 9 in. × 4 in. × 21 lbs. are the only R.S.J. available.

The maximum concentrated dead load such a simply supported girder can carry in the centre is about 4·5 tons.

Reference to *Figs.* 5 and 6, however, shows that even with exceptionally stiff decking, the maximum reaction would be well above this figure—even with 9 girders.

If the girders are "fixed" at their ends and well embedded in concrete, they should be capable of supporting 9 tons concentrated in the centre.

K is now $_{19\frac{1}{2}}$ and hence with 9-in. × 4-in. decking

$$c = 19\tfrac{1}{2} \cdot \frac{600 \cdot 48}{13500 \cdot 81 \cdot 1} \cdot 120^3 = 236 \text{ about.}$$

Reference to *Figs.* 5 and 6 shows that when $c = 236$, at least 7 girders are required to bring the maximum reaction below 9 tons.

The moment of resistance of the decking is 21·5 ton-inches, nearly, and for the B.M. to be below this value when $c = 236$, *Figs.* 11 and 12 show that 9 girders are necessary.

Nine girders should therefore be adopted.

With 10-in. × 5-in. decking, $c = 515$, and the moment of resistance of the decking is 37·3 ton-inches.

To bring the maximum reaction now on any girder below 9 tons, either 4 or at least 6 girders are required. And to bring the B.M. on the decking below 37·3 ton-inches, at least 6 girders are required.

Hence 6 girders should be adopted in this case.

(iii.). Suppose 12-in. × 12-in. baulks are available for the same span of 10 ft. then with 9-in. × 4-in. decking $c = 1000$ approximately.

The safe central dead load on a girder is 8·57 tons if the limiting stress is taken at 2,000 lbs. per square inch, and the moment of resistance of the decking is 21·5 ton-inches.

The strength of girders therefore necessitates at least 5 girders, but for the decking to be satisfactory, even 9 girders will be insufficient.

With 10-in. × 5-in. decking, having a moment of resistance of 37·3 ton-inches, $c = 2180$, and hence the strength of the girders necessitates at least 5 girders, while for the decking requirements, 7 girders would be barely sufficient.

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Seven girders might however be adopted, and the stress in the main girders—exclusive of that produced by the dead weight of the bridge would be 1,550 lbs. per square inch—a more satisfactory figure for these members than 2,000 lbs. per square inch.

(iv.). With 18-in. × 9-in. main timber girders of 20-ft. span, and 10-in. × 6-in. decking having a moment of resistance of 53·6 ton-inches, $c = 11850$.

The maximum reaction on a girder should not exceed 7·23 tons, so that if 6 girders are provided, the requirements both of the decking and of the girders should be satisfied.

In all these examples the girders have been taken as equally spaced, though possibly some economy might be effected by unequal spacing.

It may be noted too, that for large spans, the effect of other wheel loads—*e.g.* those of the tractor hauling the gun—would need to be included in the calculations, but for spans such as the above these loads are spaced sufficiently far from the gun, to be neglected.

In conclusion I wish to thank Lance-Corpl. B. G. Norton, R.E., for his assistance in preparing the diagrams.

APPENDIX.

The following is the notation that has been adopted in the paper :—

W = total equivalent dead load on the two wheels, *i.e.* $(17 \times 1\frac{1}{2})$ tons = 25·5 tons.

$w_0\ w_1\ w_2\ w_3\ \ldots$ } The load carried by each girder or roadbearer—taken
$w_0'\ w_1'\ w_2'\ w_3'\ \ldots$ } outwards on each side of the centre of the roadway.

E = modulus of elasticity of the decking material.

E_1 = ,, ,, ,, girder ,,

I = moment of inertia of the section of decking carrying the load.

I_1 = ,, ,, of the section of a main girder.

d = width of wheel tyre (20 in. in this case).

d_1 = distance from centre of roadway to inside of wheel.

$\delta\ \delta_0\ \delta_1 \ldots$ = the deflection in inches of decking or girders.

L = span of main girders in inches.

l = distance from centre to centre of main girders in inches.

$c = \dfrac{KL^3}{E_1 I_1}$. E.I. where

K = coefficient of deflection for main girders.

e.g., $K = \frac{1}{48} = .02083$ for a simply supported girder and a concentrated central load.

$= \frac{1}{192} = .00521$ for a girder with fixed ends and a concentrated central load, etc.

Table III. shows a few slide rule values of $\dfrac{K.E.I.}{E_1 I_1} \times 10^4$ when $K = \frac{1}{48}$ from which c may be easily obtained, when the span L is known.

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TABLE III.

Girders.		Decking.					
		9″ × 3″	9″ × 4″	10″ × 5″	12″ × 5″	10″ × 6″	12″ × 6″
		Values of I.					
		20·25	48	104·16	125	180	216
		Values of MR.					
		12·05	21·5	37·3	44·6	53·6	64·3
Size.	I_1	Approx. values of $K \cdot \frac{E.I.}{E_1 I_1} \cdot 10^4$.					
R.S.J.'s. in. in. lbs.							
18 × 7 × 75	114·9	·163	·387	·842	1·01	1·45	1·74
15 × 6 × 59	628·9	·298	·708	1·54	1·845	2·655	3·18
12 × 6 × 54	375·5	·50	1·185	2·58	3·09	4·45	5·33
12 × 6 × 44	315·3	·595	1·41	3·065	3·68	5·29	6·35
10 × 6 × 42	211·5	·887	2·105	4·67	5·48	7 90	9·47
10 × 5 × 30	145·6	1·29	3·06	6·63	7·96	11·45	13·72
9 × 4 × 21	81·1	2·32	5·48	11·92	14·30	20·60	24·70
8 × 4 × 18	55·69	3·37	7·98	17·40	20·80	29·95	35·95
Timber. in. in.							
10 × 5	416·6	10·13	24·0	52·1	62·5	90	108
12 × 6	864	4·88	11·58	25·15	30·2	43·5	52·3
12 × 9	1296	3·26	7·73	16·7	20·12	29·0	34·8
12 × 12	1728	2·44	5·79	12·6	15·07	21·7	26·1
14 × 14	3201·3	1·32	3·12	6·79	8·14	11·7	14·05
18 × 9	4374	·965	2·285	4·96	5·95	8·57	10·3

The chief formulæ that have been employed, and which may be derived by the usual methods of the calculus, are as follows :—

(*a*). Cantilever carrying a distributed load over part (*d*) of its length.

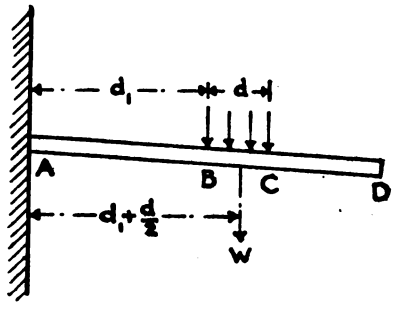

Fig. 13.

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The deflection (δ) at a distance x from A, between A and B (*Fig.* 13)—

$$\delta = \frac{W}{EI}\left(d_1 + \frac{d}{2}\right)\frac{x^2}{2} - \frac{Wx^3}{6EI} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1).$$

The deflection (δ) at a distance x from B, between B and C (*Fig.* 13)—

$$\delta = \frac{W}{EI}\left\{\frac{d.x^2}{4} - \frac{x^3}{6} + \frac{x^4}{24d} + \frac{d_1^2 x}{2} + \frac{d_1 dx}{2} + \frac{d_1^2 d}{4} + \frac{d_1^3}{3}\right\} \quad \ldots\ldots\ldots(2).$$

The deflection (δ) at a distance x from c, between c and D (*Fig.* 13)—

$$\delta = \frac{W}{EI}\left\{\left(\frac{d^3}{8} + \frac{3d_1^2 d}{4} + \frac{d_1 d^2}{2} + \frac{d_1^3}{3}\right) + \left(\frac{d^2}{6} + \frac{d_1 d}{2} + \frac{d_1^2}{2}\right)x\right\} \quad \ldots\ldots(3).$$

(*b*). Cantilever carrying a single concentrated load at a distance d_1 from the fixed end.

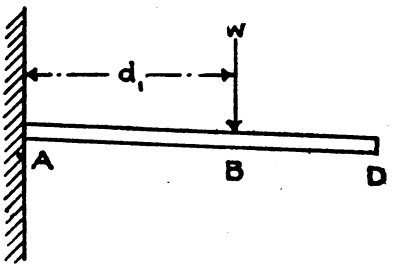

FIG. 14.

The deflection (δ) at a distance x from A, between A and B (*Fig.* 14) —

$$\delta = \frac{W}{EI}\left\{\frac{d_1 x^2}{2} - \frac{x^3}{6}\right\} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(4).$$

The deflection (δ) at the point immediately under the load—

$$\delta = \frac{W.d_1^3}{3.EI} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(5).$$

The deflection (δ) at a distance x from B between B and D—

$$\delta = \frac{W}{EI}\left(\frac{d_1^3}{3} + \frac{d_1^2 x}{2}\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(6).$$

Note.—Equations (4), (5), and (6) are special cases of equations (1), (2), and (3) respectively, *i.e.*, when d approaches 0.

(*c*). A simply supported beam of span l, carrying a central distributed load over a length $d = nl$.

The maximum deflection—

$$\delta = \frac{W.l^3}{EI}\left\{\frac{1}{48} - \frac{4n^2 - n^3}{384}\right\} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots(7).$$

(*d*). A simply supported beam of length l, carrying a concentrated load W, at a distance a from one support and b from the other.

The deflection under the load—

$$\delta = \tfrac{1}{3}\frac{a^2 b^2}{l} \cdot \frac{W}{EI} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(8).$$

Or when $a = b$

$$\delta = \tfrac{1}{48}\frac{Wl^3}{EI} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(9).$$

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AEROPLANE SHED.

By CAPT. A. E. MANN, R.E.

IN the issue of the *R.E. Journal* for March, 1917, an article by Capt. G. C. Gowlland, R.E., on the "Construction of Aeroplane Sheds in the Field" is published. In connection with it, the following account and drawings of some Temporary Aeroplane Hangars which have been erected at —— may be of some interest.

The erection of four sheds each 60-ft. span by 45 ft. deep and 14 ft. high at sides was asked for and completion at an early date specified. It was decided to build the sheds in couples and the putting in of concrete foundations and erection of the steel rails was commenced during the first week in August, 1917. On the 16th at 7 a.m. the first couple of sheds was completed and in use by R.F.C. for erection of aeroplanes, and work was commenced on second couple. At 11 a.m. a violent storm occurred which caused several of the reversed suspension cables (composed of 1-in. steel wire rope) to snap owing to upward thrust occasioned by whirlwind action of the wind. The remainder of these cables snapped like fiddle strings and the whole span of 120 ft. of canvas roof lifted bodily above the tops of centre supports. Complete dismantling, except taking down of rails, was necessary, and this was completed by 6 p.m. It was then decided to use 2-in. steel wire cables in reversed suspension cables as had been used for upper cables, an upward thrust of 10 lbs. per sq. ft. being assumed for purposes of calculation.

On the 21st August the second couple of hangars was completed and occupied by the R.F.C. and work recommenced on first couple. These were finished on the morning of 25th August.

The sheds were built with the aid of certain native carpenters, assisted by a small gang of local unskilled labour. These sheds have withstood several heavy storms, and would appear to be of as permanent construction as is required for aeroplane hangars in the field. The renewal of Paulin roof when necessary would be a small matter.

The drawings which accompany this will explain construction and the calculations are simple, although the assumption as regards wind pressure must necessarily be vague.

Experience has shown that an allowance of 10 lbs. per sq. ft. over the whole of roof surface, for both upward and downward thrust would appear to be ample.

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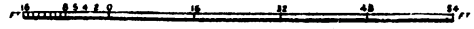
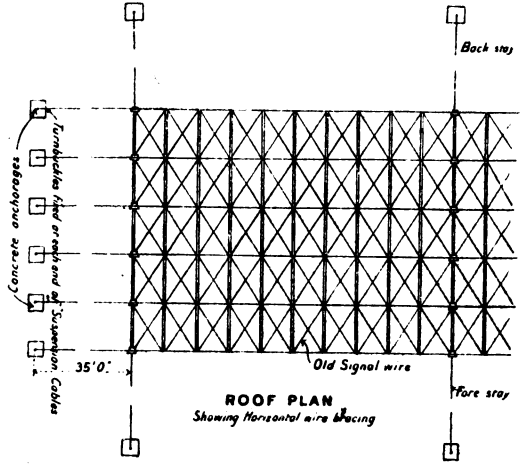
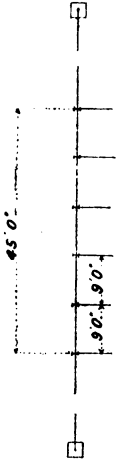
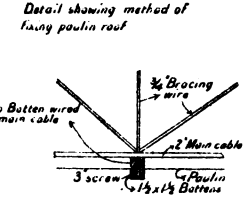
DESIGN FOR
TEMPORARY AEROPLANE HANGARS.

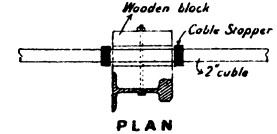




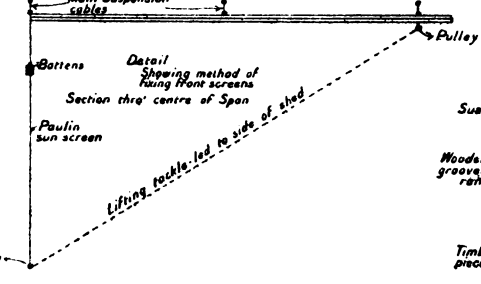
ROOF PLAN
Showing Horizontal wire bracing

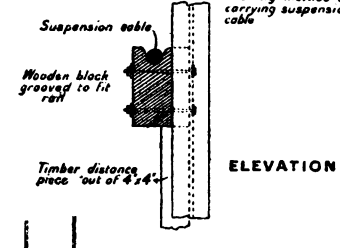




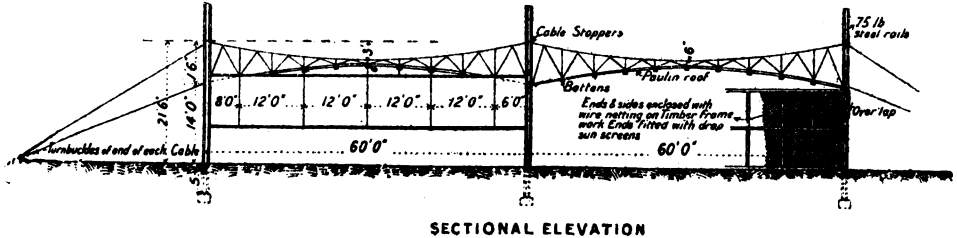


PLAN

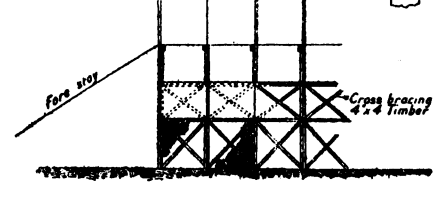



Details Showing method of carrying suspension cable
Suspension cable
Wooden block grooved to fit rail
Timber distance piece cut out of 4"x4"

ELEVATION



SECTIONAL ELEVATION



PART END ELEVATION
Showing cross bracing & overlap of canvas

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TRANSCRIPT.

APPARENT DIELECTRIC STRENGTH OF VARNISHED CAMBRIC.

(From the *Journal of the Franklin Institute*).

In December, 1913, a paper by Mr. F. M. Farmer was read before the American Institute of Electrical Engineers in New York on "The Dielectric Strength of Thin Insulating Materials." A large number of experimental observations were recorded in the paper, on the apparent dielectric strength of thin sheets of varnished cambric, hard rubber, oil, and air, when tested between opposed parallel circular disk electrodes of various diameters. It was shown that in all cases the apparent dielectric strength diminished when the diameter of the disk electrodes was increased. With varnished cambric sheets the dielectric strength diminished 13.4 per cent. between 1.1 and 5.1 cm. of disk diameter.

It is generally accepted that, provided the tested dielectric sheet has a thickness not exceeding, say, 5 per cent. of the disk diameter, the electric field across the sheet is very nearly uniform. It might therefore be supposed that the area of the tested sheet would not affect the breakdown voltage, which, in a strictly uniform field, should be simply proportional to the thickness of the test sheet and independent of the area.

The only reason that was suggested in the discussion following the paper for the apparent diminution in breakdown voltage with area was a "weak-spot" theory. That is, it was supposed that a large disk would probably cover more accidental weak spots than a small disk, and so would be likely to invoke a lesser breakdown voltage. It is impossible to deny the validity of this argument, and yet it is not easy to assign a quantitative value to this diminution according to such a theory. Moreover, essentially the same phenomenon was presented with films of oil and air, fluid media in which weak spots are not supposed to occur.

The subject received attention in the M.I.T. laboratories during 1913—1914 in thesis work. Mr. L. H. Webber repeated and confirmed a number of the original observations in the Farmer paper. Again, in 1914—1915, Mr. G. Y. Fong repeated the tests, with sheet cambric previously immersed in oil. The diminution in rupturing voltage with disk diameter was then found to be distinctly less with oil-immersed cambric than with air-immersed cambric.

A complete series of dielectric strength tests was then carried on in the years 1915—1917 by Dr. R. J. Wiseman, under an appropriation from the American Telephone and Telegraph Company. A great variety of mechanical and electrical conditions were tried. The simplest arrangement arrived at was to support a test sheet of varnished cambric upon a fixed flat horizontal metallic disk electrode 10 cm. in diameter. The upper electrode was then laid on top of the test sheet so as to lie symmetrically over the lower fixed electrode. The breakdown voltage was supplied from a sine-wave alternator, through a 10-kva. step-up transformer. The voltage on the primary or low-tension side of the transformer was regulated, by varying the field excitation of the alternator, in such a manner that the secondary electromotive force impressed on the test sheet rose at the rate of approximately 1,000 r.m.s. volts per second. The electrodes of the test sheet were connected directly to the

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secondary terminals of the transformer by relatively short copper wires. Intermediate water resistances were used, at first, in these tests; but they were afterward removed without appreciable effect. A specially calibrated voltmeter in a tertiary circuit of the transformer enabled the r.m.s. electromotive force applied to the test sheet to be noted at the moment when rupture occurred.

It was found that when the upper electrode was a single metallic disk, the r.m.s. breakdown voltage fell off 13.3 per cent., as the area of the upper disk was increased from 1.1 to 18 sq. cm.

When, however, the upper electrode was formed of a number of separate brass disks, each 1.13 sq. cm. area, all resting on the test sheet and each connected to a common terminal by a straight, fine copper wire 40 cm. long, there was only about 1 per cent. diminution in breakdown voltage when the number of the little upper disks was increased from 1 to 16, with a corresponding increase in total active area from 1.1 to 18.1 sq. cm.

It thus became evident that the diminution in apparent dielectric strength with increase in size of the disk electrodes did not depend upon the active electrode surface, but upon the way in which the electrode surface was put together. This test was checked with different observers and apparatus at the Electrical Testing Laboratories in New York.

It was further ascertained that when the multiple upper electrode disks were set together into a connecting brass backing or frame the diminution in breakdown voltage with increase of active area from 1.1 to 18.1 sq. cm. increased to about 15.4 per cent., or even more than with the original single brass disks.

Again, when the multiple upper electrode disks were set into a hard-rubber back frame and connected together by short, strong copper wires immediately above the rubber frame, the diminution of voltage was 10.8 per cent.; whereas, if the connection was made by fine, straight copper wires about 40 cm. long to a common terminal, the diminution fell to 5.8 per cent.

By the courtesy of Mr. Farmer, all of these tests were repeated at the New York laboratories and checked in substance, although the agreement as to diminution was not precise in detail.

No satisfactory demonstration has yet been obtained as to the reasons for the above-mentioned phenomena. They suggest, however, the possibility of the existence of very high-frequency electric oscillations superposed upon the voltage wave of the testing frequency, which was 60 cycles per second throughout. It is conceivable that when a high-potential alternating electromotive force is impressed upon the two disk electrodes, which form, with the interposed test sheet, a condenser, high-frequency disturbances may be set up between different parts of the condenser, considered as an oscillating system. If such high-frequency oscillations occurred, air pocketed between the surface of the varnished cambric and either electrode would be ionized, and the ions might actively bombard the dielectric in the destructive manner which Ryan and other high-frequency experimentalists have already demonstrated. When the disk electrodes are enlarged, the frequency of such parasitic free oscillations would be lowered, but their amplitude and energy would be increased. If, however, the electrode surface is broken up into elements connected together by relatively long, thin wires, such oscillations would be damped and hindered. Confirmatory experimental evidence will, of course, be necessary before such a theory of diminution in breakdown voltage with disk diameter can be reliable.

A more detailed description of the tests and apparatus appears in *Electrical World* for December 15th, 1917, Vol. 70, No. 24.

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REVIEWS.

THE PRISMATIC COMPASS AND HOW TO USE IT.

By MAJOR A. D. ST. G. BREMNER, M.C., R.E.—(E. R. Watts & Son. 2s.).

THIS Pocket Manual on Military Magnetic Compasses should prove invaluable not only to those who have little or no technical knowledge of the subject but also to those who are more experienced in it. For the benefit of the former it is written in simple language, and elementary mathematics only are used.

The first of the three parts into which it is divided explains the principal of the magnetic needle, and briefly describes a number of Military Types of Magnetic Compass. Part II. gives instruction in handling and testing the instrument, and in its use in marching and traversing. Part III. gives methods of range-finding, measuring the distance between inaccessible points, triangulation for sketching, etc.; working out many problems with no higher mathematics than simple arithmetic.

The book is profusely illustrated with plates and diagrams, and contains much useful information.

J.D.B.

ELEMENTARY MATHEMATICS AND THEIR APPLICATION TO WIRELESS TELEGRAPHY.

By S. J. WILLIS.—(The Wireless Press, Ltd.).

THIS small book consists of a collection of instructional articles which were originally published in *The Wireless World*, and is obviously intended as a help to wireless students who have not had a thorough grounding in elementary mathematics. It would however undoubtedly prove useful in refreshing the memory of others about to enter upon a special study of Wireless Telegraphy. A moderately large field is covered in a clear and concise manner, the subjects treated being Logarithms, Geometry, Algebra and Trigonometry in their elementary stages, with further chapters on Sectors and the Use of Squared Paper. In the last-named chapter the author touches very lightly on the Differential Calculus, more, apparently, with a view to arousing an interest in the subject than anything else.

The author has endeavoured to concentrate on points which have a more immediate application in wireless telegraphy and gives a fair number of practical examples on these points.

Tables of Logarithms and Trigonometrical Functions, to four figures, are given at the end of the book.

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PAGES D'HISTOIRE, 1914—1917.

Published by the Librairie Militaire Berger-Levrault, 5—7, Rue des Beaux-Arts, Paris.

The 139th number of the above series is entitled *Le Traitement des Plaies de Guerre*, it is from the pen of Monsieur A. Sartory, Professor at the École Supérieure de Pharmacie, Paris, and Chief Bacteriologist at the École Supérieure de Pharmacie, Nancy, and deals with surgery as practised in the French Army during the present War. The volume is illustrated; although its contents are likely more particularly to appeal to members of the medical profession, yet there is much therein which may well claim the attention of the ordinary layman.

In an introduction to the volume, it is pointed out that the question of the infection of wounds is a matter which is receiving much attention at the present day. The Great War is continually posing new problems for solution in every calling in life, and particularly so in the field of surgery.

The infection germs, which more especially make their presence felt at the Front, take birth and develop with a rapidity particularly disconcerting to the bacteriologist and the biologist; these germs find a suitable soil for their growth in the persons of wounded men.

The modern inventions used in the War of to-day have enormously increased the number and the types of wounds. Bullets, the shock of high explosives, bombs, grenades, torpedoes, inflammable and corrosive liquids cause injuries of very diverse kinds. Fortunately, the progress of modern science has not resulted in the development of destructive agencies alone; it has been responsible, though perhaps in a minor degree, in contributing means for alleviating human suffering also.

Destruction is at all times more easily effected than repair; the barbarity of the Germans has been responsible for much destruction, but to the patriotic zeal of savants, of surgeons, of physicians has it been due that, at the same time, the formidable task of salvage of human wreckage has been carried on with an extraordinary measure of success.

In connection with the treatment of the wounded not only have miracles of science been performed, but there have also been miracles of devotion on the part of the nursing staff, who have rendered invaluable assistance to the medical men by their co-operation in tending suffering humanity.

At the outbreak of hostilities an organization was hastily introduced to provide first aid to the wounded. Many methods of treatment were proposed and tried; but a great number of them were eliminated by the surgeons as soon as the superior efficaciousness of certain methods became evident. The mistakes made in the first days of the War were remedied, and, among other things, the practice of sending distinguished surgeons to the actual battlefield to carry out surgical operations was abandoned, since the adoption of this course seriously compromised the efficiency of the Army Medical Services.

During the three years and more that the War has been in progress experience has taught that the surgeon must seek the co-operation of

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the bacteriologist and the histologist in his every-day work, since, in the treatment of wounds, so much depends on the state of infection thereof. It is now fully recognized that a correct diagnosis of the condition of wounds cannot be based on a bacteriological, biological or chemical analysis alone, but must proceed on more comprehensive lines, so that the information obtained in relation thereto may be mutually corroborative.

Antiseptic and aseptic methods of treatment and the use of serums and nutritive artificial liquids have added seriously to the complications in carrying out operations on patients and have also been responsible for considerable additions to the surgical arsenal. However, surgeons have been amply repaid by the results obtained by them for the courage they have exhibited in cutting themselves adrift from old and useless traditions. At the present date, surgery has definitely abandoned methods of empiricism and has resorted instead to experimental science for the data required for its beneficent work, much to the advantage of the wounded heroes of the War.

Monsieur Sartory treats his subject under eleven heads. The first section of the volume deals with the microbic infection of War wounds. It is pointed out that since the introduction of antiseptic surgery three groups of methods have been successively in use: (1), the antiseptic method; (2), the aseptic method; (3), the rational or specific method in which serums or artificial nutritive liquids are used.

All War wounds are unfortunately infected by micro-organisms from the outset. The presence of these infection germs and their growth are factors that make the treatment of War wounds a matter requiring special care, and give rise to the adoption of suitable measures for the protection of the tissues owing to the presence of pathogenetic agencies. The growth and development of microbic culture in wounds is briefly traced in this section.

The second section deals with the histological development of War wounds during the first few hours after they have been caused. It is pointed out that War wounds are not only characterized by several stages in the development of their microbic infection, but also by the series of very special transformations which the tissues forming the walls of the wound suffer in their structure. These two developments, the microbic and the histological, which occur in wounds, are intimately related to one another; in both cases the nature of the force producing the wound determines their character. A brief account is given of the nature of certain kinds of wounds, and the precautions to be taken in treating them.

The third section deals with the question of antiseptics and the methods of treatment of infected wounds at the period immediately preceding the present War. Monsieur Sartory recalls that it is only within the last half-century that such powerful aids as antiseptic practice have been placed within the reach of the surgeon. From time immemorial medical practitioners have used certain substances and certain methods in the treatment of injuries; more recently it has been recognized that these methods of treatment were clearly on antiseptic lines. The ointments and balms, which occupied so large a place in the therapeutic surgery of the doctors of antiquity and of the Middle Ages, were employed above

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all things for the purpose of isolating a wound and for providing it thus with protection from the atmosphere and from external agencies. It was on these foundations that Guérin and Lister built up the methods adopted by them, methods which have made their names famous and placed suffering humanity under a great debt of gratitude to them.

The fourth section gives a brief outline of the antiseptic methods employed and those that have been recently proposed.

The fifth section deals with the antiseptic methods advocated during the present War. The Carrel, Mencière and Vincent methods are briefly described.

The sixth section gives a short account of the methods of treatment based on the use of therapeutic serums. It is stated that the serums used hitherto have been obtained from the blood of animals, principally the horse, and prepared so as to provide those inoculated therewith with a great measure of immunity against the contraction of various contagious diseases. Descriptions are given of the methods employed in the preparation of certain serums.

The seventh section deals with methods of treatment where serums or nutritive artificial liquids, improperly called physiological serums, are used. Short accounts are given of what has been done in this field by the principal workers therein.

The eighth section is on the subject of ambrine. Ambrine is a mixture of paraffin and resinous gums; its value in surgery was discovered some 16 years ago by Dr. Barthe de Sandfort. The method of its preparation, its physiological effects and the manner in which it is employed, and other particulars regarding its use are briefly described.

The ninth section gives a short account of the means employed to alleviate the sufferings of the wounded during their transport and contains a reference to the articulated splints invented by Surgeon-Major Dutard.

The tenth section briefly discusses the question of the measures which should be taken to prevent the infection of War wounds. It is from their soiled clothing that wounded soldiers run the greatest risk of dangerous infection; the main requirement then is to render these garments inocuous by frequent washings and sterilization. The wearing of a garment in the nature of a dust-coat is a great protection; such garments should be undyed, dust-proof, waterproof, and washable. The rainproof of rubbered or oiled materials worn by some French officers is said to possess protective qualities of a very effective order. The garments ordinarily worn can also be rendered harmless to some extent by treating them with antiseptic substances.

The eleventh section contains the conclusion. There are, it is stated, three stages in the treatment of wounds:—(1), the mechanical stage; (2), the antiseptic or chemical stage; (3), the stage for physiological measures. It is for the foregoing reasons that surgeons require as their collaborators men in other fields of medical science, the bacteriologist, the histologist, and the biologist, in order that they may jointly follow, step by step, the developments of the infection germs in War wounds. By means of such collaboration remarkable results have been obtained during the present War, a fact to which some of the illustrations contained in the volume under review bear ample testimony.

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The 140th number is entitled *Pourquoi nous nous battons*, and contains two short articles dealing with the French War Aims, and an account of the proceedings in the French Chamber of Deputies on the occasion of the special meeting held on the 5th June, 1917. The two articles are from the pens of General Petain and Monsieur E. Lavisse, of the Académie Francaise.

General Petain's article has already appeared in the *Bulletin des Armées de la République, No.* 252; in it he tells us that many have but a hazy idea, or maybe have forgotten, why it is that France is fighting to-day. He continues: "We are fighting because we have been attacked by Germany.

"We are fighting to drive the enemy out of our territories and in order to prevent, by means of a peace established on a secure and firm basis, a repetition of a similar act of aggression at a future time.

"We are fighting because it would be a crime to betray, by a shameful surrender, both our dead and the rising generations of France.

"We are fighting in order to secure for our land a peace which will restore a state of ease and comfort in the existence of its people and which will rid France from the continual state of anxiety which, in the event of an inconclusive termination of the War, would render the life of its people more intolerable than it is at present.

"We are fighting with tenacity, we are fighting with discipline, because therein live the essentials for victory."

The General discusses the question: Who is it that originally wished for and still wishes for War? He feels that so much documentary evidence has been published, which conclusively brings home the responsibility for the War to its true authors, that it is almost out of place to raise again the question as to this responsibility. But, for some time past, the Germans have been busy attempting, by means of new lies, to obscure the situation, and it is therefore necessary to expose their tricks anew. Further, the Kaiser's socialist commercial travellers are going about saying: "What matters the origin of the War? The responsibility therefor can only be established in the distant future." Unfortunately, there are some in certain neutral countries, and even in France, who have been persuaded to adopt the same cry: "What matters the origin of the War?"

The origin of the War, however, is a matter of considerable importance. It was Germany that prepared for, wished for and precipitated the War; it is Germany that is responsible for its continuance; she still hopes to be able to establish a tyrannical domination over the remainder of the World. The origin of the War discloses to us the aims of which Germany has been in pursuit; aims she has made desperate endeavours to dissimulate by means of successive and different statements, which, however, all bear the mark of deceit upon them.

The history of the events of the summer of 1914 has been told many times. Every Government, including that of the enemy, has published its diplomatic correspondence, and Germany stands condemned by the evidence she has herself made public.

General Petain recalls that Austria unjustly attempted to saddle Serbia with the murder of the heir to the Hapsburg throne and en-

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deavoured under the guise of " reparations " to rob Serbia of her independence. Humiliating as were the Austrian terms Serbia was counselled by Russia to accept them and intimated her readiness to acquiesce. But on Germany's promptings Austria expressed herself dissatisfied with Serbia's reply. Germany wished for war and by mobilizing her troops on the 31st July, 1914, imposed the adoption of a similar measure on Russia, and, therefore, in spite of the efforts of the Entente Group to maintain peace in Europe, hostilities broke out ; by degrees a great part of the civilized world has found itself drawn into the Titanic struggle.

Germany had for many years been preparing her schemes against Russia and against France ; the former she had wished to push back towards Asia, the latter she had hoped utterly to crush out ; being thus enriched and aggrandized Germany would finally have been able to reach the culminating point of her ambition, the domination of Europe.

France, being tied by a solemn obligation, felt bound to stand by Russia in her day of trial. Her desire for peace had been so great that in the past decade she had submitted to many an affront from insolent Germany without taking the steps necessary to insist on an ample apology. And even in the autumn of 1914, the French Government took the precaution, General Petain reminds us, of withdrawing its troops to a distance of 10 kilometres from the Frontier in order that no unfortunate incidents might occur to precipitate a War. The Germans crossed over into French territory without declaring War, but finding that the French were not to be provoked thus, Germany finally declared War on France ; an excuse had to be found, so the latter was accused of having committed unneutral acts. It was alleged among other things that French aviators had thrown bombs on the railway at Nuremberg, and this excuse was solemnly communicated to the French Government by the German Ambassador at Paris. On the 3rd April, 1916, the Municipal Authorities of Nuremberg admitted that no such acts as alleged had taken place.

Attention is called to the violation of Belgium's neutrality by Germany and to the admission of the wrongfulness of this act by Bethman-Hollweg, who finally, as is well known, resorted to equivocations with the object of explaining away the effect of his words, when he realized that universal reprobation had been brought down on the Fatherland in consequence of her treacherous act.

General Petain refers briefly to Germany's War aims, and points out that the Pan-German programme provides for depriving France of her Northern and Eastern Departments (Flanders, Artois, Lorraine), of her most valuable mineral, industrial and agricultural resources ; with this loss of territory France is threatened with a still further reduction of her population. This programme also provides that France after she has been bled white, shall be mulct in a sum tenfold as great as that extorted from her by Germany in 1871 as a War indemnity ; further, the intention clearly exists that France shall be placed in a position of economic bondage, the labour of her sons devoted to producing the fruits of her soil and the output of her factories are to be exploited in the interests and to the profit of the King of Prussia. Like unto Germany's designs on France are also her designs on Europe.

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Although beaten at the Marne and on the Yser, held in check at Verdun, obliged at several points to yield ground, with the cordon formed round her in Europe tightening, Germany nevertheless has not yet been brought into that frame of mind which should lead her to renounce her odious dreams of conquest. The more desperate has her position been made, the louder has she cried out for " compensation."

Humiliated by the checks that her troops have met with, reduced to a state of famine by the blockade of her frontiers, bled also in the heavy fighting, no doubt Germany desires peace, but it is a peace which must be, in her own words, " full of honour," that is to say, one *full of profit.* It is such a peace that she has offered to the Entente Powers ; a peace that will enable her to prey on those who may foolishly allow themselves to fall victims into her power.

It is only the blind who are likely to be caught in the snare set by Germany. The proof of Germany's bad faith is to be found in President Wilson's reply to her peace offer. Whilst still the Chief of a Great Neutral Power, being anxious to assist in the restoration of peace in the World, he called upon the belligerents to make known their War aims. The Entente Powers at once responded to his appeal, not so Germany ; her Imperial Chancellor absolutely declined to make known his country's War aims.

Germany's reticence can alone be due to the fact that she still cherishes her design to dominate the World. She wished for War in order that she might accomplish her purpose. She alone of all the Powers in Europe had made complete preparations for War ; alone in Europe she desired it, rushed headlong towards it, precipitated and declared it, rendered it inexpiable by her proceedings, barbarous by the means employed ; and now by reason of the fact that she has not the frankness to avow openly her exorbitant pretensions to dominate the World, she remains the only obstacle to a durable and honourable peace.

Whilst Germany is fighting as a beast of prey, so on the other hand France is fighting honourably in defence of her liberty and to safeguard her future existence.

Monsieur Lavisse's article opens with a reference to the economic causes of the War and to industrial Germany. He calls attention to the great change in the conditions of the Fatherland which took place within an exceedingly short space of time. During the first quarter of the last century 80 per cent. of Germans were engaged in agriculture, and that of a poor kind. To-day Germany is one of the greatest industrial Powers of the World. After 1871, her economic progress received a fillip ; since 1895, it has advanced by leaps and bounds to giddy heights. *At no period of history has there been seen in any other country, in so short a space of time, a growth in its industries and in its wealth on so formidable a scale as has been seen in Germany in the past four decades.*

At the same time, the increase of population in the Empire has been phenomenal ; the population which was 41 millions in 1871 had nearly reached 70 millions immediately prior to the War. The change in the condition of Germany to which reference has been made has led to results which have made themselves felt throughout the World.

Germany, owing to the energy and method of its people, produces much

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more than is needed for home consumption ; it is therefore necessary to seek markets outside the limits of the Empire for the surplus not required at home. Such markets are essential. By reason of this overproduction Germany's fate is to be expansionist.

She has expanded in many ways. Her children have emigrated, temporarily or permanently, into different parts of the Old World and of the New for the purpose of establishing themselves in business. Forming powerful groups, encouraged and assisted from the Capital of the Fatherland, whence they have received directions and money from the banks, they have set to work steadfastly everywhere and everywhere have they succeeded. When the War broke out Great Britain, France and Italy found that Germany had obtained a hold on their economic life which in a short time would have ended in strangulating them. Practically every other country in the World made a similar discovery.

Germany's expansion has also been assisted by her Colonial policy. Although the greater part of colonizable lands was already in the possession of those nations whose people had first concerned themselves with colonial enterprise, Germany too had dreams of founding a vast Colonial Empire which was to have had a great future. No complaint can be made against her for having such ambitions. If in the competition between nations her people proved themselves more hard-working, more energetic, more expert than the people of other lands so much the better for Germany and so much the worse for other nations. But Germany was not content with the measure of success vouchsafed to her. It was painful to her to feel that she was an importer of iron, coal, copper, cotton and even cereals ; this state of affairs seemed to her intolerable. *Germany wished then to have, by right of ownership, all the raw materials required for her manufactures, for her commerce, for her food supplies. Her wish was to possess these in what place soever in the four quarters of the earth they might be found, to what people soever they might belong.* Covetousness was at the bottom of it all, and one of the causes of this War, and not the most insignificant one, was this same covetousness. War is a business with Germany, a wholesale business, *ein grosses Geschäft. By War she wishes to satisfy the appetite which has increased as she has continued to devour.*

Monsieur Lavisse next deals with the moral causes of the War, and German vanity. He reminds us that the vanity of no other people in the World, even that of the Romans not excepted, has at any time been equal to the vanity of Germany ; the Germans claim the property in every virtue of the heart and of the mind. Their tomes are overflowing with declarations of admiration and affection addressed by themselves to themselves ; the most striking and the most extraordinary among these declarations are those to which expression is given by the philosophers and renowned thinkers, by celebrated professors, by generals, by statesmen, aye, by the Kaiser Wilhelm himself.

It is more than a century ago that Fichte, one of Germany's great philosophers, told his compatriots :

" *It is you who, among modern nations, have been specially gifted with the germs of human perfection, and it is to you that the premier place for*

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bringing about its development has been confided. Should you go under humanity will succumb with you without any hope of future regeneration."

It is but 10 years ago that the Kaiser Wilhelm declared :

" One and all, the middle classes, peasants, labourers, are alike imbued with the same sentiments of love and fidelity for their Fatherland ; the German people are the block of granite whereon the Lord our God will be able to raise up and complete the civilization of the Universe ; then will come true the prophesy of the poet : ' The World one day will owe its salvation to the German Empire.' "

It is the Kaiser who is also responsible for the following :—

" The dear Lord would not have troubled Himself so much about our German Fatherland had He not reserved a great destiny for us ; we are the salt of the earth ; God has intended us to undertake the task of civilizing the World."

These sayings show the extraordinary infatuation of the Germans ; they verily believe that they are the Elect of the Lord at the present day, much as were the Jews the chosen people in a former age. They have persuaded themselves that it is to them that the Almighty has revealed His schemes and laws ; it is to them that He has entrusted the mission of instructing other peoples and of imposing upon them His decrees.

The Germans would have us believe that it is not the right only to exercise mastery over the World that has been accorded them, but indeed a charge has been laid upon them to undertake this mastery as a solemn duty. Monsieur Lavisse tells us German vanity has undoubtedly been one of the causes responsible for the present.

The political causes of the War and Prussianized Germany are the subjects next introduced. It is pointed out that Germany lived for a long time in a state bordering upon anarchy. During this period Germany consisted of more than a hundred separate States, each living its individual life. The authority of the Emperor was a negligible quantity. But, among these States one acquired a markedly predominating position ; this was Prussia. At the beginning of the XVIII. Century, it was an insignificant kingdom with a population of about a couple of million souls. However, in the time of Frederick William I. and that of Frederick II. it blossomed into a military Power. Everything became subordinated to the needs of the Army. The finances were administered with rigid economy ; no luxuries were allowed in any part of the kingdom ; there was no extravagance at the Court ; everybody worked hard. In other countries, the nobility and upper classes claimed a measure of independence ; they resisted the oppression of the Crown ; they were occasionally in a state of rebellion ; in Prussia, on the other hand, the nobility and upper classes served the Crown ; it was held by the Prussian squire to be an honour to serve, he took pride in doing so. Succeeding generations, from father to son, served in the Army. A military caste came into existence ; it held the lower orders in contempt ; it was harsh on the peasantry ; it was always docile towards the master and stood erect before him, heels together, the right hand at the salute. In this state no one was allowed to think for himself ; the phrase, *nicht raisonnieren*, contained the injunction of the master which bound all.

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The organization of Prussia was based on the requirements of War. The small kingdom of Prussia, consisting as it did of small slices of separated territory, needed a War so that other territories might be conquered, in order that the separated slices might be linked up and welded together.

It was towards the end of the Napoleonic Wars that Prussia became one of the great Powers in Europe; under the political leadership of Bismarck, it acquired the position of Sovereign Mistress of Germany.

Prussia has continued to retain her instinct for War. The King of Prussia, when he became a German Emperor, retained his status of King in Prussia. The lust of conquest continues to dominate his whole policy. *War, the national industry of Prussia, has to-day become the national industry of Germany.*

Monsieur Lavisse summarizes the situation in Germany to be as follows:—

It consists of a people who have become an enormous overproductive, ambitious and covetous industrial Power. This people is suffering from mental derangement due to its vanity; it believes itself to be charged by its God with the mission of governing and saving the World.

This people is governed by a soldier, imbued by heredity with military instincts, a conqueror by tradition, who commands the vastest military force the World has ever known.

Combine all these things, or rather consider them as combined; trade, philosophy, religion, militarism, they all tend towards the same end, which is the supremacy, the hegemony of Germany. And the Chief, the Kaiser Wilhelm, though he may raise a smile in us when he proclaims himself the representative of God, has, on the other hand, the right to say that he does represent his people and that to a nicety, for he honours trade, he philosophizes, he preaches, he is the War Lord. . . .

Never, in any place, at any time, have a people steered so directly and consistently for War as have the German people.

Monsieur Lavisse gives under the heading "The Programme of German Ambitions," a brief recapitulation of Germany's War aims. These aims have been fully set out in the notice on the 137th volume of the *Pages D'Histoire* series (*vide R.E. Journal* for December, 1917, and January, 1918), it is therefore not necessary to repeat them here.

In conclusion, it is stated that having considered the words and acts of Germany's leaders, and having shown that the acts confirm the words, it is possible with an easy conscience to lay the accusation: *Germany wished to become Mistress of the World.*

To the question "Why then are we fighting?" Monsieur Lavisse makes reply:

We are fighting to defend our land, inherited from our ancestors; to resume possession of Alsace and Lorraine, of which the enemy violently deprived us in 1871, in spite of the unanimous protests of the people of those provinces, who are still French at heart. We are fighting in order to avenge our dead and our ruins, in order to punish those who have played the part of bandits and assassins, those who have been responsible for the destruction of our monuments and of our land, those who have submitted our civil population to a *régime* comparable only

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to the harshest conditions of old-time slavery. The Germans have proved themselves ruffians of a species hitherto unknown, for they have had behind them all the forces of modern science, forces which they have misused; their acts of barbarity have been inspired and regulated by precepts systematically co-ordinated to form a doctrine. The Germans, builders of systems of philosophy, have originated a brutal philosophy of War.

We are fighting, our Allies and ourselves, in order to defend the liberty of our labour against a Power that desires to dominate the Universe with a view to exploit it in the interests of its own industries and its own commerce.

We are fighting in order to defend our liberty of thought, for this Power desires to place under its own directive control the intellectual and moral progress of humanity, under the pretext of providing for the salvation of mankind. A German has said that Germany must, as did Rome in ages past, dictate to men "the forms of their ideas." Nothing could be more intolerable than the domination of the mind of man by a Power infatuated with itself, holding in contempt every one who is not bone of its bone and flesh of its flesh, insolent, brutal and whose great "idea" is that Might alone creates Right.

Finally, in fighting against the most redoubtable military Power that the World has known, we are making War against War. We are firmly resolved that peace shall be organized on so powerful a basis that every disturbing State will in future be brought to reason by the goodwill of the other States, strongly armed for the purpose. We wish for a complete victory in order to spare our children from the horrors that have caused humanity to weep so many bitter tears during the past three years.

The concluding article in the volume relates to the extraordinary meeting of the French Chamber of Deputies which was held on Tuesday, 5th June, 1917. After the preliminary business had been dealt with, the Government permitted the following motion to be submitted to the Chamber:—

"The Chamber of Deputies, the direct expression of the sovereignty of the French people, sends greetings to the Russian Democracy and to the Democracies of her other Allies.

"In complete sympathy with the terms of the protest which, in 1871, was addressed to the National Assembly by the representatives of Alsace-Lorraine, provinces torn from France against the wishes of their peoples, the Chamber now declares that at the conclusion of the War, which has been imposed on Europe by the aggression of Imperialist Germany, in addition to the liberation of the invaded territories, there must be returned to their Motherland Alsace-Lorraine also, and just compensation made for all damage done.

"The aims of France being far removed from all schemes of conquest or of the subjection of foreign peoples to a state of slavery, the Chamber relies on the efforts of the Armies of the Republic and of the Armies of her Allies, after Prussian Militarism has been crushed, to secure guarantees for a durable peace and for the future independence of communities, large and small, which will be organized, on lines now being worked out, into a Society of Nations.

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"Confident that the Government will obtain these results by the co-ordinated action of the military and diplomatic services of all its Allies, the Chamber rejects all schemes of annexation and moves that normal business be resumed."

Monsieur Alexander Ribot, the French Minister, wound up the debate on this motion by calling on the Chamber to accept the above motion; he expressed the hope that its acceptance would restore unanimity in the Chamber.

During the course of his speech Monsieur Ribot repelled the charge that there had been anything in the nature of secret diplomacy on the part of the French Government; such methods of conducting the affairs of the nation were impossible in the Republic. The diplomacy of France, he claimed, was based on a policy of sincerity, frankness and unequivocal dealings.

Referring to the terms of the motion set out above Monsieur Ribot told his audience that though France had, 45 years ago, suffered from a policy of oppression, the revenge which she was seeking to-day was not revenge of a kind that would result in producing oppression, but rather the revenge which consists in translating into the rights of nations the ideas of justice, liberty and equity held in France. He advised the members of the Chamber not to be deceived by formulas framed by those who wish to dissimulate and hide their true intentions. The desire of the inventors of these formulas is to lead the democracies of the world astray, to create a widespread belief that France is seeking the conquest of new territories. He proceeded: "No! We seek justice and right, we wish to re-occupy those provinces which have never ceased to be anything but French at heart. (*Loud Applause*). They were French by their own wish, for they gave themselves to France. During the course of the great Revolution of 1790, they attended the *fête* of the Federation in order to signify their adhesion to France.

"Since then they have lived the life of France, they have formed an integral part of France, and when they were torn from us, we felt that there was a void that wanted filling in this noble land of France. It is necessary that they should be returned to France, because they belong to her, because they do not belong to those who took them from us, not by persuasion as we had done, but by violence, by the harsh right of War, a right which we repudiate." (*Applause*). "We wish for no annexations by acts of violence; we desire simply the restitution to us of that which is ours." (*Applause*).

Monsieur Ribot concluded by making a strong appeal to the Chamber to support the motion before it and pointed out that it contained the true answer to those who, by their manœuvres, were attempting to divide France and to deceive her. "This will be," he said, "the only, the true answer; France cannot be vanquished."

The 141st number contains the official communiqués issued by the Central Government to the French Provincial authorities during the month of June, 1917; it is the 31st volume dealing with this subject.

The 142nd number contains the Diary of the War for the period 1st January to 30th June, 1917; it is the sixth volume of the kind issued with these series.

W. A. J. O'MEARA.

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NOTICES OF MAGAZINES.

REVUE MILITAIRE SUISSE.

No. 10.—*October*, 1917.

The Neutrality of Belgium.

One of the saddest things in the present War is the persistence with which Germany has been attempting to disparage Belgium in the eyes of the whole world by accusing her of having acted dishonourably. Much literature has been published in which a critical examination is made of the insidious charges directed against Belgium by Germany, notably from the pens of Max Waxweiler, of Fernand Passelecq, and of Baron Bayens; needless to say, these charges have been proved to be entirely baseless and most unjust. The Belgian Propaganda Bureau at Havre has given the widest circulation possible to the literature in question.

Major Marsily contributed an article entitled *Les Chefs d'État-Major de l'Armée Belge et le respect de la Neutralité* to the number of the *Revue* for June, 1917 (*vide R.E. Journal* for November, 1917), in which he examines the German charges from the point of view of Belgium's military preparations for War. The Belgian Propaganda Bureau has recently republished the article in question in pamphlet form at the price of 75 centimes. A copy of this pamphlet accompanies the number of the *Revue* under notice. The reproduced article is accompanied by a map, and also by three official memoranda which have not hitherto been made public; the memoranda consist of a statement made by Baron Beyens, the Belgian Foreign Minister, in March, 1917; of a note relating to the Barnardiston-Ducarne and the Jungbluth-Bridges incidents; and of a statement made by Baron de Broqueville, late War Minister, at a secret session of the Belgian Parliament held in 1913.

In the last-mentioned statement Baron de Broqueville informed his audience that the Belgian Government had learnt, some time before the War, from an authoritative source that the then recent increases of the German Army had been deliberately planned in order to provide for the invasion of France *viâ* Belgium, and he told them that an important personage, now known to be the late King of Roumania, had in a friendly spirit counselled Belgium to take seriously in hand preparations for her defence, as it was improbable that the miracle of 1870 would be repeated.

Impressions from the Austro-Hungarian Front.

VIII.—*The Army of Transylvania.*

The Valley of the Uz.

The article begun in the *Revue* for August, 1916 (*vide R.E. Journal* for November, 1916), is continued in the number under notice; the

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text is accompanied by a panoramic view of the country in which the engagement near Sosmezo was fought.

At the end of December, 1916, the front of the I. Austro-Hungarian Army (General von Arz) extended along the frontier of Roumania, from the Valley of the Uz, a tributary of the Trotus, to the summit of Magura, S. of Dorna Watra ; this front was about 75 miles long.

The Gyimes Pass, which connects the Valleys of the Haut-Maros and the Trotus, is the most important feature in this region ; the only lateral railway in this locality passes through it. Von Arz's Army consisted of two Austrian Army Corps and a Bavarian Division ; on its right was von Gerok's Army group and on its left the VII. Army (Kövess).

The G.H.Q. of the I. Army was situated about 50 miles from the front, at Szekely Udvarhely. This village had suffered in an earlier phase of the War, having been pillaged and destroyed by the Roumanians in their retreat.

The writer of the original article relates his personal experiences with the VI. Austro-Hungarian Corps which formed the right wing of von Arz's Army ; its headquarters were at Csik Czekefalva when he joined them. He was struck with the admirable manner in which the supply services had been organized.

A short account is given of a visit to the headquarters of the 39th Honved Division during the last days of 1916 and the opening days of 1917. This division held a front of some 6 miles on heights south of the Uz, and had the 61st Division on its left. There was a lull in the fighting at that time.

The Engagement at Sosmezo.

The Valley of the Oïtoz or Oituz lies some 12½ miles south of that of the Uz ; the Oïtoz is a tributary of the Trotus. A good road leads from Kezdivasarhely, where the headquarters of von Gerok's Army were located, *viâ* Sosmezo, to Onesti, on the Trotus. This road ends at Bereczk, some 15½ miles on the Austrian side of the frontier.

The XXXIX. German Reserve Army Corps and the 71st Austro-Hungarian Division took part in the engagement at Sosmezo, which was fought on the 5th January, 1917. These formations advanced with their centre on the main road ; their wings pushed forward to the heights of Runcul (3,634 ft.) and of Sandor (5,376 ft.). The village of Sosmezo had been in the hands of the 71st Division since the previous day. The road had been destroyed in many places between Beresk and Sosmezo by the retreating Roumanians, who had also blown up all bridges over the river. However by dint of hard work Austrian Engineers had bridged the river in several places by the time that the advance in question began.

The Austro-German Artillery, consisting of 12-in., 6-in. and 4-in. howitzers and field pieces, were in position in rear and in front of Sosmezo and in the forest near Harja.

The main Austro-German infantry attack was directed against the heights N. of Harja, whilst the artillery devoted its attention more particularly to the Russo-Roumanian forces occupying M. Paltinisu.

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The Austro-German infantry made good progress on the right bank of the river; they established themselves in new positions, made a fair number of prisoners and captured quantities of munitions of various kinds.

Preparations for Trench Warfare in the Swiss Army.

It is stated that little is known of the methods and details of trench warfare in the Swiss Army. Trench warfare involves the employment of an immense artillery force and results in an enormous expenditure of ammunition. Without this artillery nothing can be done either on the defensive or in the offensive. The Swiss Army is without such artillery and as it is situated, so to speak, between the two belligerents, it occupies a somewhat precarious position. In view of this state of affairs some there are who have contested the utility of the Swiss fortresses. The writer of the original article points out that in spite of the views of those who depreciate the value of these fortresses, they are of immense value and in the early days of a war would enable Switzerland to make the most of the mobile portion of her army on the open part of her frontier. In view of the fact that Switzerland may become a belligerent at any time and, in consequence, may have to employ her army in trench warfare, it is urged that measures should be taken to familiarize Swiss troops with the details of this kind of fighting. An outline of a programme of instruction is given.

Capt. Adrien Balédent.

Capt. Balédent was a contributor to the pages of the *Revue*; he was recently killed in action. Colonel Mayer pays a tribute to the memory of a fallen comrade and furnishes some extracts from the diary kept by Capt. Balédent during the present War—the last of the entries is dated 26th April, 1917. The deceased officer was much struck by what he saw of the British Army; he was a most enthusiastic officer and an excellent companion.

Notes and News.

Switzerland.—A special correspondent writes that in his notes published in the number of the *Revue* for July, 1917, he contested the views of Monsieur Ador, who had invited the Federal Council to consider the desirability of cutting down expenditure in the Swiss Army. The motion of Monsieur Ador was, however, adopted by 86 votes against 50 in the National Council, after an interesting discussion; the leading points of this discussion are touched upon in the original contribution.

It is stated that in spite of the action taken in the Chamber the Swiss people are willing that the necessary credits should be provided for the maintenance of the Army and for works in connection with national defence. The present situation, it is alleged, has been brought about by the ineptitude of the Higher Command, the weakness of the Executive Power and the apathy of the Legislative Power. It is hoped that, by the co-operation of the Federal Council with the newly-elected Chamber,

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the harm done in matters connected with national defence may even now be repaired and that the Swiss Army may once more become a democratic institution purged of all antipatriotic and caste spirit.

International Matters.—The policy of the Confederation during the present War is alleged to have been paradoxical. The Swiss Confederation, it is claimed, is in advance of Europe so far as concerns the interior organization of Switzerland and the progressive spirit encouraged in that country. The Swiss Confederation is nothing more than a Society of Nations; an arrangement which, it is claimed by some, will tend to reduce the frequency of wars.

The War has, it is said, tested this society and the experience has been an encouraging one; in that under circumstances in which the forces tending to produce *dissociation* were strong, nevertheless *association* has continued to exist. It is explained that the forces of disruption have been neutralized; firstly, by the tradition which has long created affinities between the Swiss cantons which have caused the greatest importance to be attached to the continuance of their association as providing the safeguard for their free existence, and as providing an organization preferable to any other political combination. In the second place, there stands the high respect that the cantons have always maintained in regard to the treaties binding them together. These two circumstances, the policies based on traditions of reciprocal tolerance and of respect for contractual obligations, have enabled the Swiss to realize their wish and their will to live united.

The paradox of neutrality is, it is said, the doctrine known as the "*principe d'État*"; this doctrine is accepted as a fundamental article of political faith by the Swiss Confederation. The question is whether Switzerland should give countenance to those who have violated the principle involved by their conduct towards Belgium, or those who went to the assistance of the latter country in support of the principle in question. If the Latin and Romande Swiss were alone concerned, there is no doubt as to what the attitude of Switzerland would be, but the attitude of the German Swiss has to be reckoned with. Under the circumstances the best has to be made of the situation and, in order that internal strife may not be introduced into the country, Switzerland has to abandon the idea of acting deliberately in support of principles held to be essential by her and has, so to speak, to put her sovereignty into her pocket. This painful necessity for the line of conduct imposed upon her is spoken of as a virtue.

On the other hand, by remaining neutral when the interests of International and the Moral Law demanded the adoption of another course, the Swiss Confederation has shown itself, it is said, behind Europe. It is for this reason that Helvetic policy during the War is considered paradoxical.

Necrology.—The death is announced of Colonel E. Secretan, who was in command of the Swiss 1st Division. He rendered great services to the State and to the Swiss Army. He was one of those who was responsible, by his attitude in the Federal Chamber, of putting an end to

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the politician-officers; therefore to him was due, in a large measure, the regeneration of the Swiss Army. He was a military author of no mean order and contributed largely to the pages of the *Revue*.

INFORMATION.

France.—In the number of the *Revue* for July, 1917 (*vide R.E. Journal* for December, 1917) an article appeared under the title *La guerre de mouvement.* The author of the article in question has provided a further contribution on the subject in the number of the *Revue* under notice. He states that the Allies are far from being in a position at present of crushing the German Army. The equilibrium established between the Allied forces and the German Army towards the end of 1914 has not been as yet upset. The forces at play in the two camps at the end of 1914 being indicated by the symbols MH and M, simply in one case, and by the same letters with subscripts in the other (where the former represents human material and the latter material pure and simple), if they be equated we have

$$MH+M=M_1H_1+M_1.$$

By July, 1917, the summation on each side had grown N-fold; this naturally, as already stated, left the two sides as evenly matched as they were two-and-a-half years earlier. During this period the means of attack have only increased in the same proportion as have the means of defence. It is a repetition of the old contest, half a century long, between artillery and armour plates.

It has taken years for the French Revolution to bring about that state of affairs in France which has enabled her to organize victory; it has taken Great Britain nearly two years to bring her "contemptible little army" up to the dimensions of the French Army. It will be two years or nearly so, according to the author of the original article, before the Allies are in a position to crush the German Army. But he does not think that Germany will fight on to the end. The minds of the German people have already passed through two phases. During the first months of the War, they little cared that Germany had forced on the world the most terrible War of all time. They had before them but the visions of the final supremacy of the Fatherland definitely established throughout the Universe. By degrees, as success receded into the dim distant future, aye and even became problematical, they felt that their armies were only fighting to maintain for "Deutschland" that position which she had acquired during four decades of peace. The German mind has yet to go through a third phase; after having abandoned all hope of a rapid triumph, it must allow the idea of resistance to be transformed into the idea of submission.

The augmentation of the forces of the Western Allies by the immeasurable resources of America must at last upset the balance in favour of the Entente Powers, and the collapse of Germany is therefore a sure thing.

This number of the *Revue* concludes with bibliographical notices relating to recent publications and with a list of works received for review.

W. A. J. O'MEARA.

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RIVISTA DI ARTIGLIERIA E GENIO.

July—August, 1917.

INFLUENCE OF INTENSE AND PROLONGED CANNONADING ON THE RAINFALL.

At the meeting of the Academy of Science on the 25th April of the current year Mons. Deslandres made an interesting communication on this subject.

When the first artillery, he said, announced the fact that the long cannonading consequent from great battles provoked the fall of rain, this relation of cause and effect was generally admitted as probable after the War of the Revolution and of the Empire. It was confirmed that violent rain followed the Battle of Ligny (16th June, 1815) and that this delayed the Battle of Waterloo, allowing the entry into action of the Prussian troops. So, also at the end of the Battle of Solferino there was a violent storm which favoured the Austrian retreat. The present War also offers several similar examples.

The supposed relation of cause and effect is stated to be denied by several authors, to such an extent that the question to-day remains unsolved. In fact to arrive at certain conclusions it is necessary to know accurately in each case, the local and general conditions of the atmosphere to be able to attribute the fall of rain exclusively to cannonading. But, documentary evidence is wanting, and the necessary information is not complete.

The author adds that he has not the time or the documents required for this study and limits himself to showing that the facts relating to artillery, examined in the light of modern physical science, appear possible and even probable, and seem to be borne out by recent discoveries regarding the condensation of vapour. In fact, discharges of artillery should cause electrization and ionization in the atmosphere, and the water vapour when saturated is condensed more rapidly when the air is ionized and especially when the ionization is negative.

There are many causes by which the air is ionized by the effects of gun-fire.

1. The air is stirred up and violently displaced and in consequence the gaseous molecules colliding one against the other are electronized.

2. The same violent displacements caused by projectiles and the fragments of shells cause a sensible ionization of the air.

3. The earth broken up by the explosions, sets free the air contained within its pores, which is strongly ionized.

4. The incandescent gas, caused by chemical reaction, issuing from the muzzle of the gun in the act of firing, and that caused by the bursting of the shells are strongly ionized and rich with solid particles and those of aqueous vapour; this very warm gas expands from heat in the upper strata of the atmosphere. The electric field of the atmosphere acts also on these free ionized particles, drawing downwards the positive ions and upwards the negative ones. This ascent of warm ionized gas which expands and becomes cooler, doubtless provokes in more hurried air the condenzation of aqueous vapour; and may well modify the electrical state and the general equilibrium of the upper clouds and

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cause the transformation of their small particles into drops of rain. The action thus exercised may become notable as in the battles of the present War where the rifles count by hundreds of thousands, and the cannon by thousands firing, for several days without intermission.

The influence of discharges of artillery on the rainfall is then admissible, but usually these discharges have less effect than other causes, which in the ordinary course of things produce changes of weather. The atmospheric currents which carry humid air across the oceans, and the depressions caused by rain and storms which occur on the surface of the earth, have always the greatest influence.

It may be noted that cannonading does not produce any meteorological effect when the air is dry, and to have such effect the air should be damp and saturated. Gun-fire then accelerates, and immediately provokes rain which was on the point of falling. In the absence of shock caused by artillery on the surface of the ground, the rain perhaps might fall later on or farther off, and again perhaps it might be diffused in the atmosphere in a state of vapour.

These considerations tend to show how interesting is the problem and how a special complete research might be useful. A conclusion is only possible when the conditions are carefully collected, case by case, containing the elements of the phenomenon. It may be particularly useful to register the degree of ionization of the air, and also the intensity of the electrical field.

On these communications of Signor Deslandre, Signor Lemoine observes that according to his view, if frequent and prolonged discharges of artillery have any influence on the rainfall, it can only be on slight rainfall; since heavy and prolonged rain, such as causes inundations, can only be explained by the action of strong atmospheric currents. This question, adds Lemoine, is connected with another on the effect of artillery or hail storms which were spoken of previous to the War. It is useful to record that in Italy long and well-organized experiments were made by the Italian Government, which were only interrupted when it was not found possible to come to a positive conclusion on the effects of gun-fire on the formation of hail.

At the following meeting of the Academy of Science, during a discussion, General Sebert observed that Deslandre had only considered local action laying aside the effects of violent and prolonged cannonading at great distances. Sebert, also adds, that Lemoine limits the possible effects of these artillery actions to rain of short duration. But it may be asked if owing to the intensity caused by the recent cannonading on the whole of the Western French front, and the explosion of mines, there may not occur atmospheric disturbances sufficient to produce violent and persistent rain in several directions, and also at great distances.

Many unusual facts observed since the commencement of the War have formed in France a strong conviction that the violent cannonading has been the cause of unexpected rain. There are many noticeable facts in several places of changes of weather and lowering of the barometer that could not be foreseen. Sometimes there has been abundant rain after days of sunshine and fine weather, without any warning. During the winter there are changes of temperature which

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cannot be accounted for, with snow in the southern regions of France, and even in Spain and Algeria. These facts would seem to extend to regions far from the action of unusual and repeated disturbances and it is difficult to see the origin of events equally unusual, caused by the operations of the present War ; and it is natural that these two phenomenal conditions should be placed in relation.

Sebert relates that the same problems were formerly objects of discussion. During the second Empire, the chemist Le Maout, of Saint-Brienne, called attention to these singularities, and affirmed as a fact that the violent fire of artillery provoked heavy rain at great distances. During the Crimean War, when owing to the want of telegraphic communication the notices of military events were much delayed Le Maout pretended that he could anticipate the official notices by some days, exclusively by means of observation of the rainfall in Saint-Brienne, that violent battles had taken place in the Crimea. His announcement of the Battle of Inkerman and the assault of Sebastopol obtained for him some notoriety, and he was allowed to make initial official experiments to explain whether artillery fire could provoke rain. These experiments, which naturally could not be made under analogous conditions to those of great battles, made it apparent that when the air is saturated with aqueous vapour, a violent disturbance such as that produced by the fire of guns or as mine explosions is sufficient to provoke the condensation of vapour and then rain follows. But the chemist Le Maout persisted in making reports on the fall of rain, and he made studies of distant battles that took place at that time and during the Italian Campaign of 1859, and he continued with more or less success to discover the official notices of the actions in Italy with the enemy's armies.

The facts alleged by Maout could only be explained by admitting that the atmospheric disturbances produced by violent cannonading could be reproduced at great distances in certain directions, probably by means of currents of air or gas, propagated in the upper regions of the air. These explanations, says Sebert, do not appear to be inadmissible when one remembers that for a long period after the violent eruption of Krakatoa notable disturbances, even as far as Europe were observed in the upper regions of the atmosphere. It is then quite reasonable to express the conviction that rain falling suddenly and frequently in different places is produced by violent cannonading at the Front. The official Journals have frequently sought to contradict this opinion, with the assistance of pretended scientific considerations, and the advice of competent officials, who declare that there is nothing to justify these convictions, since the official meteorological observations do not bring to light any facts that are reliable. In fact, the average reports for rain and temperature are almost similar to those of the preceding years, without such meteorological phenomena that could give indications of disturbances due to the action of artillery.

In order to justify their point of view, competent persons have called special attention to the fact that in such an enormous map as surrounds the globe, the gas produced by the action of artillery and mines can only have insignificant effects on the whole of the atmosphere. But, it may

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be asked if the question is correctly put on these terms. It is true that a movement is not supposed to be imposed on the whole map of the atmosphere, or even on a considerable part of it. It can well be admitted instead, that violent fire of artillery, or strong and numerous explosions of mines, produce ascending currents of warm air, which raised above the regions of the firing and explosions produce volumes of cold air in the upper regions of the atmosphere; and that this cold air passing to a certain distance in various directions according to the prevailing winds, may provoke rain in such places when it meets with strata of warmer air and air saturated with moisture.

There is then no need to suppose a general displacement of the air; it is sufficient to mention more limited cases, as for example the small displacement of air caused by the issuing of warm gas from factory chimneys, or even small fireplaces. To verify the exactitude of the hypothesis as formulated, it is necessary to set aside the localities in which on certain days violent cannonading has taken place, and on the other hand where rain of an unusual character had been observed at short intervals of time, also, if possible, observing from meteorological bulletins the direction of the wind blowing at certain times in the upper region of the atmosphere. By collecting combined observations of the direction of the wind and of the barometrical pressure made in certain localities it is possible to trace on a card the movements of the atmosphere in that region at a certain moment.

In a well-known work published at Geneva in 1910 by René de Saussure there is shown a method of which starting from a tracing of isobar curves and completed with the direction of the wind in several observatories, provides for tracing on a meteorological card curves indicating the movements of the atmosphere, and the direction of the wind for each point. Such a card would be beneficial to agriculture and also to navigation.

This discussion on the influence of cannonading on the production of rain, has been renewed owing to the extraordinary and torrential rains in Flanders at the commencement of the British offensive, after a violent fire of artillery. It cannot be denied that the long and furious bombardment did not leave in the air millions and millions of solid and gaseous particles which caused the air to be condensed and to fall in rain.

Taking part in this discussion, there are two articles in *La France Militaire* signed Géneral Chapel. These premise that Arago at first drew attention to the relations between ballistics and meteorology. This illustrious scientist in his researches, about 1836, with regard to the belief very prevalent among sailors that gun-fire had the faculty of dissolving temporary clouds, and preventing the occurrence of storms, came to the conclusion that this belief was not founded on concrete facts, and also that several observations tended to show to the contrary. As, for example the attack on Rio de Janeiro in September, 1711, in which 15 great ships of the line took part with violent fire of artillery and musketry which culminated in a storm producing very strong and uninterrupted discharges of electricity. The same fact has been noted on the occasion of other battles.

In order to clear up the question, Arago formed the idea of examining

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the records of the school of artillery at Vincennes, where the series was complete dating from 1806, and of examining the meteorological state of the atmosphere before and after each day of fire. The days of fire examined were 602. Arago found that the sky was entirely clouded 158 times on the morning after these days and only 128 times the day before, from which, says Arago, it may be concluded that instead of dissolving and driving away the clouds, the sound of the artillery fire condensed and brought them down. After citing the pamphlet of the chemist Le Maout, *Les Cannonades de Sebastopol*, the author of the articles refers also to the reports of one of the Army commanders in the Russian-Japanese War, in which he says that both at the Battle of Liao-tang, and of Scia-ho on the 14th October, 1904, the great amount of gun-fire was the cause of a storm burst followed by a real deluge. The author concludes by drawing attention to the studies made by him during the last 30 years, on the decisive influence in all great meteorological disturbances, meteors, falling stars, and aerolites, falling with enormous velocities. Although the velocity of artillery projectiles is infinitely inferior to that of falling stars and aerolites, their mechanical energy is considerable, and their numbers when fired in modern battles are sufficient to cause sensible atmospheric disturbances.

In the author's view the production of rain is due not so much to the sound of the artillery fire, according to Arago, not even to the vibration in the atmosphere caused by the projectiles, or to electrization, but to the cold that is produced by the rarefaction and expansion of the air caused by the passage of the projectiles, sufficient to determine the endless condensation of the aqueous particles suspended in the atmosphere. This explanation, at first sight may appear paradoxical since the movement of the projectile loses its force from the resistance of the air, and then increases the temperature of the air ; but it is necessary to consider that the phenomenon produced by the passage of a projectile is double. In front of the projectile the warm particles of air diverge, diffusing their heat into space ; behind, however, the particles being cooler converge in the direction of the trajectory, forming in the passage of the projectile a condensed stream, a kind of small cloud in the form of a fine cirrus which may cause rain. From this it may be inferred that cannonading of itself is not sufficient to cause rain, but only when the hygrometric state of the atmosphere approaches sufficiently to saturation.

Finally, in a communication of the Academy of Science of Paris, H. Hildebranson adheres to the opinion of Deslandres, and considers that following the intense and prolonged action of artillery there are currents of ascending air, since those of an anticyclone with its currents of descending air do not undergo condensation. From this last point of view he cites an experiment made in America to ascertain if it is possible to produce rain by means of violent explosions. The Governor of Texas granted a large sum for this purpose and the trial was made on the 25th and 26th October, 1892, at S. Antonio, in a district that had suffered for long periods from want of rain. Boxes containing rosselit were placed at intervals and were exploded like batteries in a battle. On the evening of the 25th, 2,000 kilogrammes of rosselit were exploded and also 150 bombs in the air and eight balloons filled with detonating gas ;

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the temperature was 22°C. and some clouds were observed coming from the west. No results were obtained. The following day the air was moist; they exploded 2,270 kg. of rosselit, 175 bombs, and 10 exploding balloons. In the night they repeated the firing and explosions, but always without any result. According to Hildebranson this failure might have been foreseen considering the atmospheric conditions; under other conditions the result might possibly have been otherwise.

This is the state of the debated question.

September, 1917.

REVIEW OF BOOKS AND PERIODICALS.

Infernal Machines, Torpedoes and Bombs.—By Ettore Bravetta, Vice-Admiral. With an appendix on Explosives for War. Milan: F. Treves, Editor, 1917. Price 6 lire.—The author is well known and appreciated for his works and also for his publications in this *Review*. This book is written with a clearness of expression and an agreeable style suitable for persons not acquainted with the technicalities of the subject. But, differing from many so-called scientific works, hastily compiled, Admiral Bravetta's work is distinguished by a rigorous technical exactitude and terminology.

The author treats especially of subaqueous infernal machines used in former times prior to the use of prussic powder, such as Greek fire, etc.

Treating of the earlier period of the art of submarine warfare, the author explains its development up to more recent times, with anchored mines and torpedoes, and ship torpedoes, etc., up to the first appearance of the Whitehead torpedo in 1864–68. From this time until its perfection, Bravetta explains the different changes, and gives a most detailed description of one of the most recent models.

Following the description of torpedoes is that of bombs, fixed and turning on an axis, both ancient and modern with special directions for the placing of torpedoes in submarines and particularly for the recent proposal made by the Engineer Cerio, for a repeating bomb-thrower that can be given to a revolver in the form of a revolving cylinder containing six chambers for as many bombs.

The author possesses in a high degree the art of holding one's interest, for in minute descriptions of complicated mechanism, and when it happens that in spite of his ability the material becomes a little too dry, he has the good sense to advise the reader to omit it.

Resuming his descriptions, Admiral Bravetta expresses his view that the torpedo, although a weapon of great power and of a marvellously ingenious kind, has its limitation, and that it will not succeed in replacing the gun, which will continue to be the real weapon of battle both by land and sea. An appendix follows, but it is an appendix that gives, as it were, in small volume, the principal parts of the book and retains the value of perspective, of exactness, and of facility of reading.

With other necessary definitions he describes the great development of picric powder, smokeless powder, guncotton, nitroglycerine, dynamite, and glycerine explosives. He then passes to the description of fulminate of mercury and what may be called the high explosives used for the

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internal charges of projectiles, and especially those with picric acid as their base, trinitroluene, and those with bases of ammonia, etc.

He concludes by asking if it may be possible to discover explosives more powerful than those now known. The question is very important as more journalists have from time to time put forward notices of new inventions, capable of resolving in a few weeks this immense world War. The author's reply to this question is apparently in the negative.

It may be said that in addition to investigations of technical minuteness the reply of Bravetta is based on a highly physical and philosophical conception of our earth in the system of the universe; science has not yet in any manner, either chemically or electrically succeeded in producing a temperature of 4,000 C. scarcely two-thirds that of the sun. It would be contrary to natural laws, and to the harmonious order of the universe, that it should be possible for this planet, in addition to the natural energy now existing, to produce an artificial force similar and equal to that, for instance, which regulates the material of the sun or the star Sirius. There is not, then, much hope—or danger according to the point of view—of success in concentrating in explosives a greater amount of powerful chemical energy.

We commend the book to the attention of those who wish to form a precise idea of arms and explosives which are of so much importance in the present War.

GERMANY.

Suspension of the Construction of Zeppelins.—From notices reported from the *United States Naval Institute Proceedings* it would seem that after the death of Count Zeppelin, who, it was always stated, was assisted in his designs by the Kaiser, a certain number of workmen employed on the construction of Zeppelins at Friedrichshafen have been sent to the Front, so that the preparation for the framework of a great airship that can usually be completed in six weeks, now occupies several months.

According to this Journal the general opinion at Friedrichshafen seems to be that no more new Zeppelins will be constructed.

E. T. THACKERAY.

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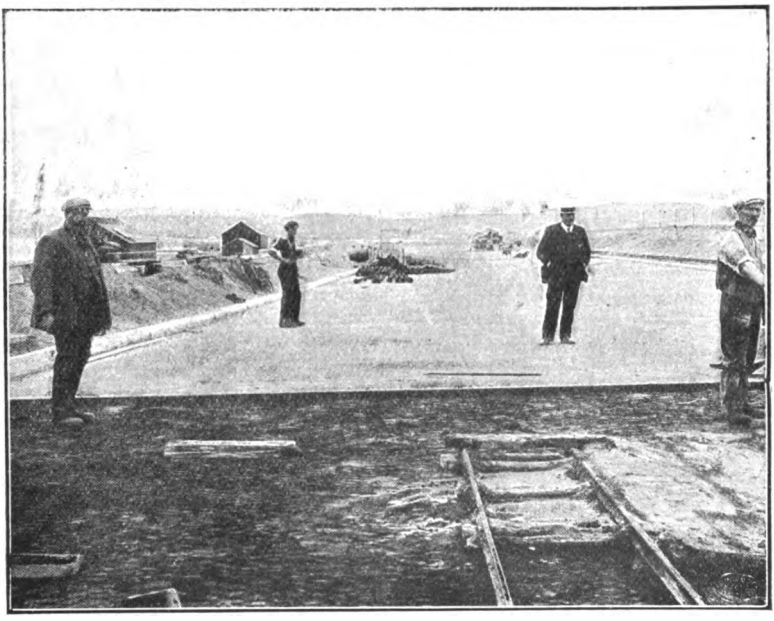

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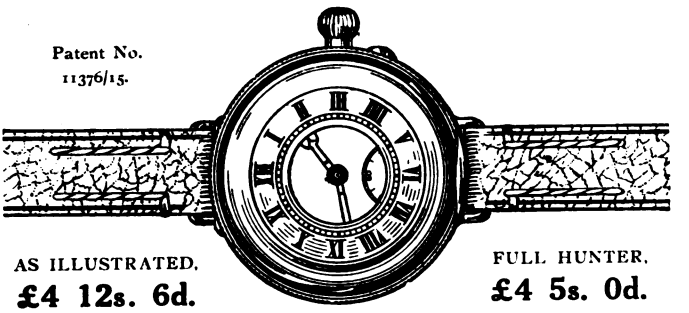

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HORSE MANAGEMENT.

By COLONEL A. S. PRATT, C.B.

THE following lecture was delivered at the Royal Artillery Institution by Colonel A. S. Pratt, and by the courtesy of the Institution we are enabled to place the valuable facts before our readers :—

Colonel Pratt said : First of all I propose to deal with the question of mules. They are very good animals and everybody is liable to get them. As long as you are absolutely quiet with them you can manage them. They are very nervous animals and you must not shout at them. They are very obstinate animals, and you must be quietly obstinate with them and then you will find they will do anything you want them to do. I have in mind the case of a man who knocked a mule about. The mule waited for him three weeks, caught him unawares and broke his leg. Those are rather the lines on which mules go. One of the first things to remember in connection with these animals is that you must be kind and quiet. If you want horses to do well and look well and work well you must be absolutely kind and quiet with them. Make friends of them and pat them and you will find they will do very good work for you ; knock them about and they will not work well. Then I must impress upon you not to play with them. Many men are in the habit of pinching them and tickling them, the result being that the animal says to himself, " Hallo, here is the thing coming to bother me and tickle me, so I must defend myself." Then the animal commences to bite and kick. If a horse begins to bite and kick you may rely upon it he has been taught to do so by being improperly treated by somebody at some time or other. Officers and non-commissioned officers should at once stamp out all signs of playing with these animals, because sooner or later such playing will turn to vice, and it will be a difficult thing to get them right again.

Then there are one or two peculiarities about mules and horses. Mules are more particular about their water and less particular about their food than horses ; horses are more particular about their food and less particular about their water than mules. This is pretty sure to happen to a good many of you before the War is over, that you will have to water a mixed force of horses and mules at a river or pond where the animals have to go in to drink. In such cases always

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remember to water your mules first. Horses do not mind so much the water having been stirred up. You will probably know that it is absolutely necessary for all these animals, whether mules or horses, wherever you are, to have as much water as ever you can give them at all times. You cannot over-water, but you can very easily under-water. What are we trying to do now with horses and mules? We are trying to get the animals fit for service in the field either overseas or in England. What sort of animal is going to suit you in the field? Not the animal that has his ribs showing, poor lines down his quarters, and all split up behind; he will last you about a week or two in the field because you do not get your food and water as regularly as in the camp or barracks. What sort of animal do we want in the field? We want an animal on what we call the big rump side. If you lift his tail up it should look as if he has got a good big pair of well-filled breeches on. That is the animal that is going to last you in the field because he has something to go upon in himself. How are you going to get this animal on the big rump side? You are going to get him by very careful attention at all times to four principal things: the first is watering, the second is feeding, the third is pace, and the fourth is grooming.

Water.—I always put water first because I consider that water is the important thing, far more important than anything else. It is a very funny thing, but watering is often forgotten. People do not forget to feed, but they often forget to water. Men often go out on fatigues with half a feed and forget to water. Nobody knows how long a fatigue is going to last, and so, when animals are sent out on fatigues, buckets should be sent out to water the horses before feeding. I saw a man the other day take two horses to water and they were very thirsty indeed. One of them finished first and put his head up in the air. The other one was very thirsty and he went on drinking. The man got hold of the head rope and got a steady pull on him and in time got the second horse to put his head up, and the man at once took him away. I said to him, "Do not take that horse away yet as he has not had nearly enough water." That horse drank at least another bucket full of water before he went away. That horse was systematically water-starved by a driver who did not understand the importance of letting a horse have as much water as it wants at all times. His stomach was all up; his coat was all wrong; and in fact he was systematically "water-starved." What I am driving at is this: when you take animals to water for goodness sake take time over it. Let the horses look about them; let them swish their tails; and if you will only give them time it's a hundred to one that down will go their noses again, and every drop that they can get down into their stomachs the better for them. That is one of the reasons why we always superintend watering. We always ought to have an

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officer and a N.C.O., if possible, superintending the watering; it should never be independent. No horse or mule should be moved till every animal has finished watering, because the moment you move one horse the other horses have their heads up and you cannot get them down again. We generally water about three times a day in the winter, and we ought in the summer to water four or five times a day or even six times a day; and they need water late at night when the weather is hot. When you have had a good sweat anywhere you want an extra drink at night, and it is exactly the same with horses. There is one thing to remember about watering, and that is, never offer animals water within say three-quarters of an hour after they have finished feeding, because if you do you may give them colic. I do not say that you will give them colic, but you may do so if you do that. Always allow as long a time as possible, and then you will not run the risk of colic from that cause. I was going round a unit some little time ago—a heavy Garrison Artillery unit—and they had four subdivisions in it. The horses in three of those subdivisions looked pretty bad, and the horses in the other subdivision looked uncommonly well. I happened to be going round with the Sectional Officer and I said to him, "How do you account for the horses of this subdivision looking better than the horses of the other subdivisions?" He replied, "I think I know the reason," and I asked "What is it?" He said "I have a very good sergeant there." I inquired what that sergeant did that the others did not. He said, "When he has got a horse that is a bit thin he is always watering it, and when it is cold he gives it chilled water." One thing about water that has struck me in this frosty weather is that some people bank up their troughs with manure right along the trough. I think it is a very good thing to do because it makes a sort of hot bed and keeps the water warm, and stops it from freezing, and the water is much better for the horses than cold frosty water. Of course you have to invent a good way of doing it so as not to stop the outflow and things like that.

Feeding.—Then the next important thing is food. If you want animals to do well you must feed them "little and often." You must not give them great feeds because they cannot digest them. They should be fed regularly. If you feed them at certain hours in the day, try and do it regularly. It is well known that 3 lbs. of corn, hard stuff, maize, oats or whatever it may be, is quite enough for the ordinary animal to digest at a meal. When you have 10 lbs. of corn it is much better to feed it in four feeds than in three feeds. When you come to heavy horses where you get 15 lbs. of corn it is far better to feed them five or six times a day. The great secret is to give them little and to give it them often. To carry that a bit further when you are on service give your animals as good a breakfast as you can and

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fill your nosebags as full as you can and hang them on your animals and away you go. Probably at about 9 o'clock in the morning somebody will say, "Do you not think we had better feed the animals now?" That would be a very good thing to do, but do not do what I have very often seen people do. I have seen them put the nosebags on at say 9 o'clock in the morning and leave them on, and perhaps they might have 5 or 6 lbs. of corn in them. Some of the horses will eat the lot and some will not, but will mess it about, and will make such a mess of it that the next time you put it on they will not look at it, and you are wasting it. Put their nosebags on by all means at 9 o'clock in the morning and leave them on, but let them have one-third of it; wait two or three hours and let them have another third and so on. In that way you will get through three-quarters of the day with a little something in the animal's stomach. What do you do yourselves on service? You get as good a breakfast as you can, and then put a crust of bread or chocolate or anything in your pocket and have a nibble at it occasionally. If you will do that with the animals and yourselves on service you will neither of you get in late at night with that great big hole in your stomach. I have proved it on service where I had very hard work for animals to do and very little food to give them. I got over the difficulty by giving them about a handful at a time, and, of course, by taking advantage of every drop of water I could get along the road.

Now, about crushed food, wherever you go, you will sometimes find a corn crusher, properly used it is a very useful thing indeed; but improperly used it is a very bad thing. "Never feed entirely with crushed food except in very special cases, which may be called veterinary cases," because if you feed entirely on crushed food what will happen is this, that the animal will get used to the crushed food and his gums will become soft, and when you send him away from here where he cannot get crushed food and he is put on to hard food, the hard food very soon makes his gums sore, and he will not masticate his food, and therefore he will get indigestion. If you have got a horse on the poor side it is a very good thing indeed to give him some crushed food, half and half, and then drop it to one-third crushed and two-thirds hard, and then gradually get him on to hard food altogether. If you send horses overseas that have been fed on crushed food they will bolt the hard food because it hurts their gums to masticate it, and very soon suffer from indigestion. The reason for their falling away will be that they have been fed on crushed food.

Maize.—We have sometimes to feed them on maize because it is a question of the supply of food; we have to feed on what we can get. Now maize as you know is generally fed in the crushed form

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and when it gets wet it swells. The result is that it swells in the animal's stomach. Therefore always soak maize well before you feed it, or it will swell in the animal's stomach and give him indigestion or colic.

Chaff.—With regard to chaff a great many people do not think that chaff is much good, especially straw chaff. The answer is that it is bulk you want in the animal's stomach. I have always fed carriage horses, hunters, etc. with a certain amount of straw chaff and a certain amount of hay chaff just to get bulk in their stomachs. Chaff starts the saliva and the gastric juices and helps the animals to digest their food. Sometimes chaff becomes very dusty and musty. Could you eat a pound of biscuits without something wet to help them down? Of course you could not. It is exactly the same with animals. The best thing to do is to put the chaff on a tarpaulin and turn it over and damp it with salt and water, but do not overdo it. Damp it so that when you put your hand in the chaff it just sticks round your fingers; and it will help them to digest their food very much. Of course you generally give the bulk of the hay at night and a little in the mornings. It gives them a foundation for the next feed they are going to receive. Take remounts. You do not know what they have got in their stomachs, as they pass through Remounts we try and get their stomachs right as far as we can. We in Remounts are able to get a certain amount of bran and linseed and so on; you cannot jam a lot of corn into them at once. It is a very good thing to sacrifice some of the remount corn at first and give them extra hay and blow their bellies out. When you have got their insides right you can then begin to shove the corn in and then it will put the flesh on.

Pace.—The next point I wish to deal with is that of pace. There is an Army Council Instruction, that came out in 1916, about the care of horses and pace. It says amongst other things that "The training of a unit should be so directed as to render it efficient and fit for service in every particular including its animals. The instruction of the *personnel* should be carried out well within the capacity of the horses both from the point of view of pace and mileage. It should seldom, if ever, be necessary to exceed the pace of the regulation trot." Now the pace of the regulation trot is 8 miles an hour. It is not half as fast as a great many of you people think. If you measure out half a mile on the Common and you try and trot at that rate you will find you are trotting a great deal faster than you think eight miles an hour is. Any horse that can trot at all can trot at that rate. Men often seem to try and get the horses to trot as fast as they can and the result is that some horses are galloping. All fatigues should always be at a walk and they generally are at most places.

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Grooming.—The next important thing is grooming and whisping. Grooming and whisping circulate the blood and keeps the animal in health. Good grooming keeps away lice. We never used to have lice before the War. We get Remounts from all sorts of places and it is up to you to get them right. Then there is another thing in connection with grooming and that is the question of cracked legs and heels. What is a cracked leg and a cracked heel? A cracked leg and a cracked heel is very much the same as a chilblain to you and me. We get our feet and legs and hands wet and cold and the blood stops circulating and we get a chilblain that tickles and breaks. How are you going to stop that in the case of horses? You can stop it by always paying great attention to drying the legs and heels. I know that we have not got any straw now. I have tried to get a little straw issued to every unit for this very reason, to dry these legs and heels. But if you have not got straw you have always got hands and you must make the men get down and rub under the fetlocks as hard as they can, and rub the legs from the fetlocks to the knees and to the hocks, as hard as they can, and start the blood coming from the heart down the arteries and back to the heart up the veins and so get the blood circulating round and round the animal's body down to the tips of his toes. If you will put in a quarter of an hour at evening stables at that it will be about the best quarter of an hour you can put in, and you keep away cracked legs and heels. If men will pay attention to drying legs and heels they will hardly ever get a cracked heel at all. There is another thing. Horses are bound to sweat. Make your men look after them then. The other day I was going round a unit about a quarter to four o'clock in the afternoon and I saw one of the horses there looking all sweaty. I asked "What have you been doing with this horse?" They said, "This horse has only just come in." I asked, "Who has had him?" The reply was, "A mounted orderly." I inquired, "When did he come in?" and he replied, "About a quarter of an hour ago." I asked, "Where has he gone?" he replied, "To his room." I asked, "What has he gone there for?" they told me "I suppose he is coming back to stables about half-past four," and the horse was simply dripping wet. That man had brought in a horse all of a muck sweat with all the pores open and he was just "hanging up to dry." If you do things like that it is a hundred to one something of this kind will happen that in two or three days someone will come and say, "We cannot get No. 23 to eat to-day, Sir." The officer will ask, "What is the matter with him?" The answer will be, "I do not know; I think he has got a touch of fever; his head is all down and his eyes are all shut up and he will not look at anything; I suppose he has had a bit of a chill." Nobody ever knows how he got the chill, but he got the chill a few days ago because somebody

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" hung him up to dry." The very best thing is to groom him at once and dry him ; walk him about in the air and dry him, throw a rug over him, etc. We lost many horses at the beginning of the War because people would not look after them when they were hot. Those are the four principal points.

Miscellaneous.—I have a few more points that I would like to make which I might put under the head of miscellaneous. First of all wherever you are you always have a certain number of horses on what we call the " hide-bound side." They are just like us ; we go out in the east wind and get our livers out of order and want something to put us right inside. The horse and the mule are exactly the same. Whilst going round some stables the other day I saw a horse looking very wretched, and I said, " What are you doing with this horse he looks pretty bad." The answer was, " Well, Sir, we are giving him double the amount of food that any other animal in the stable is getting." I asked if it was doing him any good, and was told, " No, we do not think it is." I asked, " Have you had a look at his teeth ? " and they said, " No." I said, " The very first thing when you see an animal looking like that, and his food is doing him no good, is to look at the back teeth and get hold of the A.V.C. Sergeant and it is a hundred to one that if he is a horse of say 9 years of age or over, he will have his back teeth jagged and sharp, and when he eats the sharp edges cut his gums, and he does not like masticating his food, bolts it whole, and gets indigestion, and it does not do him any good." Always have a horse's teeth looked at. Then you must try and get his inside right. If you can get bran you must do that. I know your difficulties in that direction perfectly well. But he wants something of a laxative nature to put him right inside, a bran mash, linseed oil, either in the form of oil of boiled linseed or in the form of soaked linseed or linseed cake. If you have linseed cake broken up small and mixed in the food you will introduce the oil of linseed into the animal's stomach, if it is hard and the horses don't like it, soak it and make a thick soup of it and mix with feeds, and when you have got the animal's stomach working right you can give him extra hard food, and it will do him good ; otherwise it is no use cramming hard food into him. There is another thing that you can give a horse and that is Epsom salts—two or three ounces at night ; then wait a night and give him another two or three ounces ; then wait another night and give him a couple of ounces. That will help him a bit. There is another thing that was recommended to me some time ago, but I have never tried it because I have had plenty of other things, and that is giving a horse a boiled cabbage. I am told that it is an excellent thing, and that a horse will eat it. I was told by a friend, " I always give them a boiled cabbage every Saturday night with their bran mash, and they love it, and it does

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them good." Some of you who have gardens might try it with hide-bound animals.

Skins.—Then there is another thing that officers ought to impress on their men, and that is that they should always be looking their animal's skins over to see if they have got anything that might be ringworm or mange, and see that there are no little lumps under their throats which might mean strangles coming.

Noses.—Look at their noses to see that there are no running noses which might be catarrh which often leads to pneumonia and death. Such things as strangles and catarrh are very catching, and the moment a man sees anything that is suspicious he should report it to the N.C.O., and it is everyone's duty to isolate the animal as far as possible till the veterinary officer sees the animal. There is one point in connection with the isolating of these animals that I wish to make. They are often given their water in buckets, and you should see that the buckets of water are offered them till you are certain they have had enough; and when the buckets are taken back they should be carefully cleaned and disinfected, but not at the water-trough, or otherwise they will carry strangles and catarrh half-way through your units before you know where you are. I will tell you what happened to me at the beginning of the War. I had a remount depôt here for two or three months.

Ropes or Chains in Mouth.—We sent down to fetch a lot of horses from the station, and one of the men thought he had got a wild animal to deal with, and he put a rope over his tongue in a half hitch —I suppose the animal jumped about—and he jabbed him in the mouth. He never thought of loosening it again and proceeded to pull the poor brute all the way up to the remount depôt, about three-quarters of a mile, and when the animal got there his tongue was in an awful state, and it took us, in the remount depôt, where we have every facility, about three weeks to get that animal to eat his proper food. Think what would happen to one of your men on service in the field if he so injured a horse's tongue that he could not eat for two or three days! You would lose a horse simply because of bad horse management or bad horse-mastership, whichever you like to call it. Do not put ropes or chains in horses' mouths over their tongues in any shape or form whatever, because you are very apt to injure their tongues.

Impress on Men.—Another thing you should impress on your men, that they are all mounted men now, and if they lose an animal from thoughtlessness or neglect they lose half their good to their country. About three-fourths of the work of every mounted man is the care and management of his animal, because if a battery is not fit to move because the horses are wrong what is the good of a battery of artillery? It does not matter how good a Commanding Officer you

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have, or how good a sergeant or sergeant-major you have unless you attend to these matters. If you are going to have good horse-mastership you have got to have every individual in a unit always thinking about his animals, a man is so often on his own on fatigues, etc. A man should always be thinking about his animals somewhat in this sort of way: "How am I going to get water for them? How am I going to get food for them?" He should always be thinking of how he can help them in any way he possibly can.

Keep Harness Soft.—There is one very good way in which you can help the horses, and that is keeping the harness soft. Get your men somehow or other to procure grease and rub it in the harness back and front, because soft harness will not gall a horse like hard harness. I have seen animals cut to ribbons by hard harness.

On the March, Galls, etc.—Supposing you are an officer in command of a unit with a lot of wagons or whatever they may be, when you have been going roughly half an hour on the road choose a nice convenient place by the side of the road, and draw up, and let your word of command be, "Halt, dismount"—not "Fall out"—"Look round and see that your harness is properly fitted." Now one of the principal causes of galls is due to tight breechings. If you put a tight loop round the animal and walk him round the barrack square it commences to rub a little hole and in time it will become a big hole. Now a breeching is properly fitted when the animal is pulling in the breast harness, the breeching should stand well away from his rump, but it should be just tight enough so that when you wish to stop the carriage going down hill he does not go back on the splinter bar. This fitting is only to be done by constant care on the part of all officers, N.C.O.'s, and men concerned. You have always got to be looking at it, especially the fitting of harness, when the animals are on the move. Very well, then, "Halt, dismount, look round, see that your harness is properly fitted, lift up your breast harness, lift up your breechings, tip up your saddles and let the air in, and look round for a gall starting." The moment a man sees what he thinks is a gall starting it is his duty to at once tell the N.C.O. who should at once tell the officer, and they should put their heads together to decide how they are going to stop it. You can stop it by letting out the harness, taking it up, numnah, sheepskin pads, etc., or at any rate getting the friction from where the place is. The good old batteries that went abroad at the beginning of the War could all go on the march for months at the time with hardly a gall at all, because you never saw a battery halt without everybody dismounting, running round his horse's feet to see if there were any clinches up and the shoeing-smith was required, looking round the harness to see that everything was right, and that there was no gall. When this had been done each man would go up to his No. 1 and

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say, "All right, Sergeant." With regard to the fitting of the harness, etc., that is one of the reasons why officers and N.C.O.'s have single riders who can go about their command. The normal position of an officer or a No. 1 is in rear of his command on the off side so that he can see what is going on and see that the harness is properly fitted, and he can also see to the driving. Now there are thousands of fellows driving who never thought anything about it a few months ago, and it is up to you officers and N.C.O.'s to help them in every possible way. In fact Officers' Nos. 1 and 2 ought to have their eyes everywhere and see where things are going wrong and then try to put things right; but do it quietly and tactfully.

Sitting on Animals' Backs.—Another thing I often see people offending in is this, that they sit on their horse's backs too long. You must all remember that you are pretty heavy fellows. Supposing you had got a live load on your back and it was getting a bit tired, and it is first on one side and then on the other, that's the way you riders get galls under your saddles, would you not like to get rid of it now and then and give yourself a shake? Of course you would. It is exactly the same thing with animals. Therefore get off your horse's backs and rest them whenever you can. Now there is a point about stuffy stables.

Stuffy Stables.—You will find always grooms who will stop up everything they can in their stables, and they do it because if they keep a horse in a stuffy stable it will make his coat lie down. But the result is that the animal will be a soft animal and will catch a cold sooner than any other horse. Billets in England and France are often bad. Whenever you go into billets or stables have every ventilator open and all the windows open that you possibly can. You do not want to have a direct draught on to an animal's flank because that is bad for him. You want to have the stables cold with plenty of fresh air and then you will have hard horses in them that do not mind being put out to-morrow night and brought in the next night. That is not a good thing to do, but it might be unavoidable. Give them as much fresh air as you possibly can and keep your stables cold.

Branding.—Now, with regard to the question of branding. The only brand that is allowed on horses is the broad arrow brand, 4 ins. to the right and 4 ins. below the near hip. If there is a brand somewhere near that of course you would not go and put another one on. But all horses ought to have that on the near side very visible. Horses ought to be branded for the battery or unit number on the fore feet. The near hind is supposed to be really kept for the veterinary people. All Home Service horses were marked on the near hind foot and they were supposed to have a register in the veterinary hospital so that whenever they went back

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to the hospital they were identified, and if they went back too often they were put out of the Service. The hind feet should be left unbranded.

Clipping.—Now as to clipping you all know about the order as to the hair rug being left on horses, the idea is that horses should go overseas with a natural blanket on them and that it should not be too small. A new instruction has come out about clipping and that is that clipping of 3 ins. on the tail need not apply in the case of officers' horses. The reason of that Order as to clipping the horse's tail is to prevent lice laying eggs there, and officers are supposed to have good grooms. With regard to the clipping of horse's legs, the Order is that the hair shall be left on the legs from the elbow and the stifle downwards. "Heels may be neatly trimmed with scissors." If you go and trim them up the back with clippers and trim them round the corn the mud just runs down the leg and into the fetlock, and it gets nasty and wet, you will get a cracked heel. If you leave, as you ought to leave, several inches of hair round about the corn, and do not clip it up above that, the water and mud runs down off the corn and so on to the ground, and does not come into the heel. It does not look pretty perhaps, but all horses should have that little tuft of hair left round the corn as a sort of duct to take the water off on to the ground and not into the heel.

Shoeing.—Now with regard to shoeing and shoeing smiths. Naturally we have in the Army some good shoeing smiths and we have some bad ones. We have lots of men who say that they have had a life apprenticeship, and I am always suspicious of those men because those men have been brought up in their father's forge and there has been their grandfather before them; but they merely know what they have been told by them. These bad shoers say to themselves, "I like a horse with a little foot; he is more active—nippier." Therefore they get rather too small a shoe for him, and they rasp the foot down till it fits the shoe. Then they say, "I do not like the look of this foot and I will polish it up," and they do that from the toe to the coronet. What have they done? A horse's foot is a very porous thing. It is full of little holes and if you rasp it down so as to fit the shoe and then polish it up you open the pores and let in the air and you let in the wet, and in the course of a few shoeings the farrier will come to you and say "We cannot keep a shoe on No. 4." You will ask, "Why?" He will say, "She has got such a brittle foot." I asked a Farrier the other day—"How is that?" He replied, "I do not know, Sir; I suppose it is constitutional." I said, "No, it is not constitutional, do not you see that you have allowed your shoeing smith to rasp it down to fit that shoe, and polish the hoof up to the coronet. You can see the marks of the rasp." He said, "Yes, Sir." Had he known what he was doing he

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would not have done it because now he has got to shoe that horse about once a fortnight whereas if he had left him with a good foot it would have lasted about a month. All the military horses before the War had beautiful feet because no rasping down like that was allowed. It is necessary to keep horses' toes short, but they should not be shortened from the front, but from underneath. It is a little more trouble perhaps. I know perfectly well you get a lot of these horses from America with great big feet, and you have to get them right, but you cannot do it in one shoeing. There is an Order just out that you should draw shoes tapped for frost cogs during the winter. Then there is a new Order about bedding, which increases the allowance of bedding and increases the allowance of sawdust from 5 lbs. per horse per diem to 8 lbs. That is a much better allowance. One wants of course to always give a horse a soft bed if possible to induce him to lie down and rest his legs.

Driving.—There is just one thing I want to tell you about driving. I naturally see a lot of bad driving. I see a team coming down a hill with six horses, the wheel driver sitting back and doing all he can to keep the carriage back, and I see some of the lead and centre pulling. If you see them going up-hill you will see the wheel-driver again perhaps urging his horses to go up-hill and see some of the lead and centre taking it quietly. The golden rule is this: The wheel horses do the whole of the work down-hill; the lead and centre should be just thrown out of draught, not with their traces down to the fetlock, as one so often sees them, but just eased. The moment you begin to go up-hill the lead and centre horses should do most of the work. If you will only do it in that way you will divide your work equally between your lead and centre and wheel and you will not have, as you will always see in bad driving, teams, the wheel horses looking comparatively thin and the lead and centre horses looking comparatively fat. Why cannot you pull going up-hill? Very often for this reason, that you will allow your leading horses to get too near the thing in front of you. The Order is "From the noses of the lead horses to the tail of the thing in front of them, 4 yards." How often do you have it 4 ins.? Then the horses cannot pull. When you are in single units there is no reason why you should not take 40 yards and let all your horses pull. It is a very good thing in dusty weather because you will keep the dust out of the men's throats and out of the horses' throats too.

Now whether you have got a horse sick, whether you have got a horse lame or whether you have got anything the matter with him, if he has got a heavy load to pull or carry, and if you want to help him, just say to yourself, "Now how should I, if I were the animal, like to be treated under these circumstances." You may depend upon it, on the way you decide you would like to be treated your-

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self, you would not go very far wrong in treating the animal that way.

Notes, How not to do it.—I have made one or two notes of instances that I have seen where I am sure you would not like to be treated in that way yourself, and many of them round about Woolwich. First of all, not very long ago, I saw some horses standing on the Common and they were on fatigues. They were taking some stuff that had been dug up and put in the cart half a mile away or so, and shooting it and coming back. They were standing. Naturally they got a bit warm when taking this stuff away, and it was a biting wind, and they had no rugs on. It is in those circumstances that chills come along. The officer who was in command of the battery or his Sergt.-Major might have thought of rugs being sent out on a job like that. I saw some men coming down Shooter's Hill not very long ago, and they were on a manure fatigue. It was a very wet and foggy morning. They had their horse's rugs with them, but they had them on their knees when sitting on their boxes. There was nothing wrong in that ; but those rugs were turned inside out and were being wetted, so that when they came to be put on the horse's backs they were damp to the horses. You would not like to have rugs on you that were so wetted. I saw some horses being clipped and the man who was clipping them wanted one of them to stand up. The man who had got hold of the twitch proceeded to pull the horse by the twitch, the twitch is often used unnecessarily. Would you like that? I know of a case of some horses sent on fatigue at early morning stables. The driver asked if he should water them. "No," said the Sergt.-Major, "you will not be long." The result was that the horses waited at the field stores and were not back until one o'clock, and neither of them had a drop of water or food. I should not care to have that sort of man for a Sergt.-Major. I saw some young officers the other day in charge of a battery. They dismounted the battery and they were all sitting on their horses themselves. Was that a good example? Get into the habit of getting off your horses whenever you can. I saw some young officers the other day coming down Shooter's Hill, and some of the lead and centre horses were pulling and a young fellow I noticed never looked at his horses, but had his eye fixed on something or other down the road. That does not help horses. I saw some fellows going round a corner the other day and the moment they went round the corner at a fair trot the fellow leading trotted away and he never checked his pace, and the others began to canter in the rear, the consequence being that they strung out. What happened? They pulled up one on the other like a lot of cattle trucks and got treads. That man was a bad leader. When you go round a corner you must check the pace and keep looking back to see what is going on behind you. Good driving helps

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animals tremendously, but bad driving is very hard on the animals indeed. There is nothing worse for them than bad driving, though of course we cannot help it sometimes. If you will only remember that horse-mastership is nothing but common-sense and forethought you will do well. Think a bit ahead and think how it is going to affect your animals if you do certain things with them, and think how you can help them in every way. I have often been asked the question about watering horses when they are hot, and my answer to that question is that when horses are hot, if you are going to groom them in the stable at once it does not matter letting them have plenty of water; but if you are going to hang them up for half an hour do not let them have too much. In other words use your own discretion, and do not do what I saw people do the other day: they had their horses out at riding drill, and brought them in in a muck sweat and watered them, hung them up to dry and one of them had colic and not to be wondered at.

In reply to a question Colonel Pratt said the length of hair on the heels should be about 2 to 3 ins., just enough to make a sort of duct to take the water off, so that the water will fall outside the heel.

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PORTABLE HUT FOR THE U.S.A. EXPEDITIONARY FORCE.

THIS type of portable house was designed to be manufactured in America for use in Europe. The U.S. Government called for buildings giving 2,500,000 sq. ft. of floor space to be produced in 60 days. They were to be capable of erection by unskilled labour.

Owing to the short time given for manufacture portability and ease of erection were not the only factors that affected the design. Ordinary hut construction involves work at the sawmill and then again at the manufacturer's yard where the timber is put into shape and assembled. In this case however owing to the speed condition it was necessary to design so that, with slight additions to the plant, all the work could be done at the sawmills. This design therefore departs considerably from common practice and has been criticized in consequence where the speed factor has not been taken into account.

The building is on the panel system, all floor, roof, and wall coverings being in panel units. Special panels are required for the gables. The wall panels are of three kinds, one plain, one provided with a sash window, one with the framing for a door.

The floor panels are made of two layers of grooved and tongued flooring of random widths from $2\frac{1}{2}$ to 6 in., the grain being crossed. Between the layers is tarred paper. The boards are nailed at each intersection. The side edges of two layers do not exactly coincide thus forming a $\frac{3}{4}$-in. rebate at each side so that two adjacent panels have the equivalent of a matchboard joint.

The wall panels are made on exactly the same principle ; the only difference is the insertion of a sash window or door frame in some of them.

The roof panels are only single ply held together by four battens. As in the other panels random widths of boarding ($2\frac{1}{2}$ in. to 8 in.) and as short as 3 ft. $2\frac{3}{4}$ in. can be used which is a considerable advantage. The roof panels do not profess to be waterproof since they are intended to be covered with composition roofing.

Considerable thought has been given to the design of all details. They appear simple, but are said to be the results of many trials to make erection by unskilled labour as easy as possible.

The trusses are sufficiently explained by the drawings. It will be noticed that the truss spacing is twice the width of a wall panel

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and that roof and floor panels are the same length. The building is 20 ft. wide and the average length is intended to be 217 ft.

The *foundations* consist of three rows of posts spaced at 7-ft. intervals. To these are spiked *sleepers* (two 6 in. × 2 in.), cut in random lengths. The *floor joists*, at 28-in. centres, rest on the sleepers. On the joists and spiked to them rest the floor panels, each with its long dimension parallel to the sides of the hut. Outside the floor panels but not on them and spiked to the joists are the *floor sills* lying directly under the wall framing.

Bearing Sills are nailed to the outside sleepers so that their lower edges and those of the sleepers are flush with each other. When the *corner posts*, (each made of two 4 in. × 2 in.), and the intermediate *studs*, (each 4 in. × 2 in.), are in position the wall panels are placed with their lower edges resting on the bearing strips. Three horizontal *belts* then go into place outside the panels and coach screws (lag bolts) are inserted through belt, panel, and stud. (All the holes for these are drilled ready at the works). The *top sill* is made of two 4 in. × 2 in. pieces cut in random lengths breaking joint.

It will be seen that the side wall panels are tied in at the bottom by a bolt to the sleepers and at the top by the trusses while they also bear against the ends of the floor joists. This detail gives some leverage which adds considerably to rigidity when the whole framing is bolted up.

Erection can be carried on so that after a short length of building is completed side-wall studs, panels, trusses, and roof panels are all being erected simulteneously and but a short distance apart. In a trial erection three men laid all the floor timbers and floor panels in a 217-ft. × 20-ft. hut in 2½ hours. All the parts are numbered and lettered to simplify erection and care has been taken to cut to exact dimensions so as to get easy fit.

The above description and the accompanying drawing are based on information given in the *Engineering News Record*, New York, Vol. 80, No. 1, January 3rd, 1918.

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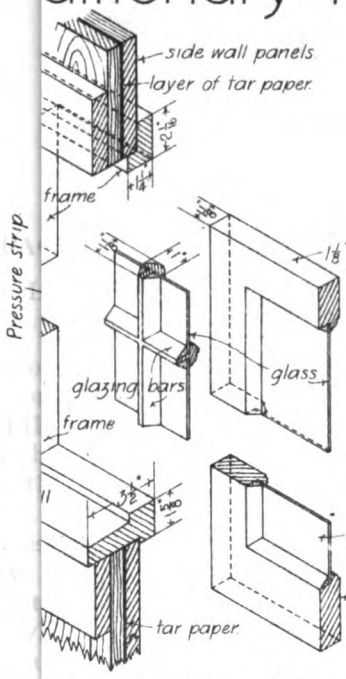

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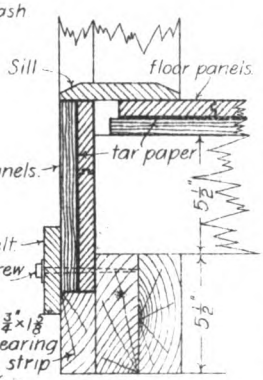
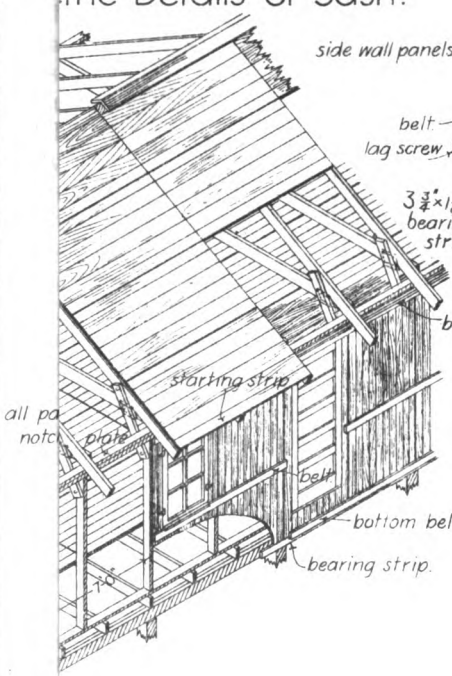


Detail of Threshold.



w. (20ft. building.)

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REVIEWS.

PAGES D'HISTOIRE, 1914—1917.

Published by the Librairie Militaire Berger-Levrault, 5—7, Rue des Beaux-Arts, Paris.

The 143rd volume of this series is entitled *Le Retour de l'Alsace-Lorraine à la France;* the contents of the volume deal with perhaps the most burning question of the day, that of the restoration of the frontiers of France as they were before the Franco-German War of 1870.

In a Preface to this volume Monsieur Henri Welschinger, of the Institut de France, tells us that no one has ever had any doubt as to the eventual restoration of Alsace-Lorraine to France. Alsatians and Lorrainers have been looking forward to this event with a confidence which cannot be shaken. Forty-six years have elapsed since on the 17th February, 1871, a solemn vow was registered on this subject at Bordeaux; it was religiously renewed at Berlin, in 1874, to the intense dismay and anger of the Germans, who even at the present day are unable to comprehend the inner meaning of such an attachment and of such fidelity as that of Alsace-Lorraine to France. The War of 1914 has effectually disposed of the Treaty of Frankfort, and Alsatians and Lorrainers have through their leaders, from the first days of the War, made it known that they consider as *null and void* the pact wherein they were disposed of body and soul without their consent. They witnessed with delirious joy the arrival of French soldiers on their sacred soil and the removal from their frontiers of the boundary marks bearing the hated design of the black eagle with its outstretched grasping claws. A thrill of emotion ran through the whole people on the day that General Pau arrived at Mulhausen, and also on that on which General Joffre visited Thann to deliver the message of affection from France to the two Provinces and to renew the solemn promise that their traditions, their customs, their religious tenets would be respected. England, Italy, Russia, the United States, all the Entente Allies and the friends of France have admitted that the claims of Alsace-Lorraine are just and that no peace will be of value which does not secure the restoration of these Provinces to France. Monsieur Welschinger calls attention to Lord Curzon's speech of the 19th December, 1916, and that made by Monsieur Terestchenko, the then Russian Foreign Minister, on the 20th May, 1917; on both these occasions the fact that the restitution to France of the occupied Provinces was one of the War aims of the Entente Powers was emphasized. Even when, subsequent to the revolution in Russia, the formula of a peace " without annexations and without

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indemnities" had been adopted in that country, Germany was made to understand by the Ministers of Russia's Revolutionary Party that in their understanding of a *statu quo*, the return of Alsace-Lorraine to France did not fall into the category of *annexations;* the surrender of these Provinces by Germany, on the contrary, was considered by them to be a pressing necessity. Later, on the 31st July, 1917, Mr. Arthur Balfour, in a reply made by him in his capacity of Secretary of State for Foreign Affairs to Messrs. Bryce and Buxton, stated that Great Britain had not entered the War for any selfish ends, but to deliver Europe from German oppression and to provide against the possibility of Wars in the future. It was necessary, he said, that, *inter-alia*, aid should be given France to enable her to be reconstituted as she was prior to Bismarck's machinations of 1870 against her. On this occasion, Mr. Balfour pointed out that the restitution of Alsace-Lorraine was a question of intimate concern to Great Britain; in looking forward to the reincorporation of the lost Provinces into the territories of France, it was evident his countrymen cherished no selfish designs.

German agents had been working for some months past to bring about a schism in the ranks of the Entente Allies by taking advantage of the War weariness prevailing in certain quarters; the reiteration, therefore, by prominent statesmen of the War aims concerning Alsace-Lorraine undoubtedly came as a surprise and created consternation in the Fatherland. Michaëlis, the then newly-appointed Imperial Chancellor, had, on the 28th July, 1917, attempted to ridicule the sentiments regarding Alsace-Lorraine to which expression had been given in the French Parliament, but after the speeches made by Mr. Balfour and Monsieur Ribot, the French Premier, on the 31st July, 1917, he certainly had no longer any excuse to remain in ignorance as to the tenacity with which the question of France's claim to the two Provinces was being continued and would continue to be pursued by the Entente Powers.

Monsieur Welschinger tells us that having in view the widespread sympathy entertained not only in Europe but throughout the world for Alsace-Lorraine; in view also of the moving debates that have taken place in the French Senate and in the Chamber of Deputies on the subject of the restoration of the lost Provinces to France, he has felt that a useful purpose would be served by collecting together in one volume the protests raised, in 1871 and in 1874, at Bordeaux and at Berlin respectively, by the representatives of Alsace and Lorraine, as also copies of the proceedings in the French Parliament and of the record of the official statements relating to the spoliation of France by Germany.

Monsieur Welschinger has also included extracts from a diary, hitherto unpublished, in which he made a record, at the time of their occurrence, of the events of 1871 connected with the transfer of Alsace-Lorraine from the protection of the tricolour of Liberty to the bondage of the yellow banner with the black eagle of Tyranny. He concludes the Preface by giving expression to the following hope:—"May this modest collection bear all the fruits which I await therefrom, and increase still more in the breasts of those who read it love for Eternal Justice and horror for brutal Tyranny." The contents of the volume are arranged in twelve short chapters and five appendices.

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The first chapter relates to the Protests of Alsace-Lorraine made to the National Assembly whilst sitting at Bordeaux, on the 17th February and 1st March, 1871.

At the meeting of the National Assembly held on Friday, the 17th February, 1871, Emile Keller, Deputy for the Haut-Rhin, read the Protest framed by Gambetta in consultation with his colleagues from Alsace-Lorraine, and made a speech which moved many of his audience to tears. Monsieur Keller concluded his introductory statement with the following remark:—"I am convinced that the proposals which I am about to place before you will receive your unanimous assent, for it affects our honour and our unity as a nation; on this point there should be no difference of opinion in a French Assembly." He then proceeded to read slowly in a firm tone the declaration which had been drawn up, the main heads of which were as follows:—

I. *The wish of Alsace and Lorraine is that they shall not be alienated.*

The framers of the declaration proceed to point out that the two Provinces had been associated with France for over two centuries, constantly exposed to the aggressions of the common enemy; they had continued at all times to suffer sacrifices in the national interests; they had sealed with their blood the indissoluble pact which bound them to France. In view of the claims then raised by a foreign Power they affirmed in the presence of the dangers which surrounded them, and, whilst still under the yoke of the invader, to declare their unshakable fidelity to France. Both those remaining at home and those fighting under the tricolour, the former by their votes and the latter by participating in active operations, desired unanimously to make known to Germany and to the world at large their immutable wish to remain French.

II. *France can neither consent to nor sign any document ceding Lorraine and Alsace.*

It is pointed out in the declaration that the cession of the two Provinces, if agreed to, would imperil the national existence of France, would be tantamount to an abandonment of those who had established, by reason of their patriotic devotion to France during two centuries, the right to look to her for protection and would also result in the infliction of a blow on France, which could not fail to divide her own people. It was further argued that an Assembly, even when elected by Universal Suffrage, could not invoke its sovereignty for the purpose of covering or satisfying acts which aimed at the destruction of the entity of a nation.

France might be obliged, it was admitted, to submit to the blows of a Superior Force, but it was not permissible for her to legalize the latter's decrees.

III. *It is not within the province of Europe either to permit or to ratify the act of abandonment of Alsace and Lorraine.*

Admittedly civilized nations are the guardians responsible for seeing the rules of justice and international law properly administered; they could not for long remain indifferent to the fate of their neighbours without incurring the danger of experiencing treatment similar to that which they might have acquiesced in when meted out to others. "Modern Europe cannot," continue the framers of the declaration, "allow a people to be taken possession of as if they were mere beasts of the field; it can-

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not remain deaf to the reiterated protests of threatened peoples; it must, for its own protection, forbid such an abuse of Force."

It was further pointed out in the declaration that a peace which involved the cession of territory by France would only result in a disastrous truce and would not be of a lasting kind. Indeed, such a peace would give birth to a perpetual internal agitation, and would only end in provoking another war. The peoples of Alsace and Lorraine entered a vigorous protest against the cession of these Provinces to Germany, and called upon their fellow-citizens of France, the Governments and peoples of the whole world to bear witness that they would hold as null and void all acts and treaties, votes or plebiscites, which might give consent to the abandonment of the whole or a part of the Provinces of Alsace and Lorraine into the hands of a foreign Power.

In the concluding paragraph of the declaration it was stated: "We, here present, proclaim the right, which remains for ever inviolable, of Alsatians and of Lorrainers to continue to exist as members of the French nation, and we enter into a solemn obligation, as well on behalf of ourselves as of our constituents, our children and their descendants to press our claims, perpetually and by every means in our power, against every usurper."

When Monsieur Keller had finished reading the declaration, he called upon the Assembly to take immediately into consideration the unanimous views of the representatives of the Bas-Rhin, of the Haut-Rhin, of the Moselle and of the Meurthe and demanded that a vote should be at once taken on their proposal. In the desperate situation in which France found herself, the Assembly could do no more than place this matter of the protest in the hands of the negotiators and rely on their wisdom and patriotism for the solution of the very difficult problem with which France was confronted at the time.

On the 1st March, 1871, Monsieur Keller again raised a protest on behalf of Alsace and Lorraine. A painful debate followed. The Assembly, however, found itself compelled to accept the preliminary proposals relating to peace (546 votes for and 107 against).

Then followed the last incident of this tragic meeting. The third representative of the Haut-Rhin, Jules Grosjean, a former Prefect of this Department, who had taken part in the defence of Belfort, rose in his place and read a final protest of which the following is an outline:—

The representatives of Alsace and of Lorraine communicated to the Assembly, before any negotiations for peace had begun, a declaration in which they affirmed in a very formal manner the wish and the right of these Provinces to remain French.

Delivered, regardless of all justice and owing to an abominable abuse of force, to the domination of a foreigner, the representatives of Alsace and Lorraine have a last duty to perform. These representatives repeat once more that the agreement whereby the Provinces may be disposed of without the consent of their inhabitants will be held as null and void by them.

It will at all times be open to all or any, Monsieur Grosjean pointed out, to press for their or his rights in such form and in such measure as their consciences may dictate.

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Before quitting the Assembly, in which their self-respect no longer permitted them to retain their seats, the representatives of Alsace and Lorraine made it known that in spite of the bitterness of their grief, the uppermost thought in their minds was a feeling of deep gratitude to those who for six months past had not ceased to defend them, and that they continued to retain an unquenchable affection for the Motherland from which they were being violently torn.

They would await with complete confidence that future day when France would be in a position to resume that great place in the world reserved for her by Destiny.

The feelings of the sons of the lost Provinces are admirably summed up in the final words of the protest: "Your brothers of Alsace and Lorraine, whose family ties are from this moment about to be broken, will cherish for France, absent though be her authority from their firesides, a filial affection which will endure until that day when she once again assumes her sway over them."

Such was the last sob of the two Provinces. The Assembly, in vain, endeavoured to persuade the representatives of Alsace and Lorraine to retain their seats in the Legislature; however, they rose from their seats and silently withdrew, their departure being unanimously regretted by their colleagues. Next day all the Bordeaux newspapers appeared in mourning.

In spite of the elapse of more than four decades, the feelings of the peoples of these two Provinces remain unchanged. The incidents which took place at Zabern before the War led the German Deputies to admit in the Reichstag that the attempt to germanize Alsace-Lorraine had failed.

With the declaration of War by Germany against France, on the 2nd August, 1914, the provisions of the Treaty of Frankfort ceased to have practical effect. Some there are who consider that Alsace-Lorraine should be sounded upon the question of their restitution to France. However, a strong feeling exists in influential quarters that, since the people of these Provinces are known to have remained unanimously loyal to France, no useful purpose would be gained by canvassing them. Further, an Entente victory can alone ensure the fulfilment of the longing wish of Alsatians and Lorrainers who have obstinately and voluntarily remained French at heart.

The second chapter contains extracts from the diary which Monsieur Welschinger kept at Bordeaux, in 1871, in his capacity of official custodian of the records of the National Assembly.

The chapter opens with the proceedings of the meeting of the National, Assembly held at the Théâtre Louis, Bordeaux, on the 17th February, 1871. Monsieur Jules Grevy was, on that day, elected President of the Assembly. In his opening speech he referred to the peril in which France was placed. Formal business having been disposed of, the President then called upon Monsieur Keller to address the Assembly, who at once rose in his place, dressed in the tattered uniform of an officer of the Mobile. The silence of those assembled in the hall was impressive. Monsieur Keller had a great reputation as an orator; he was a patriot and an ardent Catholic, a loyal Alsatian and an uncompromising one at that.

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Monsieur Welschinger touches upon certain matters connected with the framing of the declaration containing the protest of Alsace and Lorraine and tells us that when Monsieur Keller was reading it at the meeting of the National Assembly held on the 17th February, 1871, many of its passages were received by the audience with much applause. Monsieur Keller, after he had finished reading the protest, made an impromptu speech and concluded it in the following terms :—" We are in the position of the sailor who, having sunk his ship rather than surrender it into enemy hands, seeks to regain the companionship of his brethren in arms. We hold out our hands to you. . . . Do not refuse to give us yours ! "

The whole Assembly was profoundly moved when Monsieur Keller, who could not hide his own emotions, returned to his seat at the conclusion of his oration. The question as to the next step which should be taken by the Assembly was one which required delicate treatment. Monsieur Thiers rose in his place and stated that on so important a matter the first question to be decided was whether the Assembly should issue definite and imperative instructions to its negotiators or allow them a certain latitude of action. He stated, with tears in his eyes, that he shared fully in Monsieur Keller's sentiments, and thereupon invited the members to meet immediately at the offices of the Assembly to discuss the whole situation ; he wished each of his colleagues to make known what he really desired should be done, " for, it is as well it should be understood," he added, " that you cannot take refuge behind the Government you will be placing in power. Have the courage of your opinions ; whether for War or for Peace ! The question is one not affecting the fate alone of the very interesting Provinces, but the destiny of the whole nation is involved." These words, coming as they did from one elected by 26 Departments, one who had been nominated Head of the Executive of the new Republic and charged with the duty of settling the terms of a disastrous peace with the enemy, caused as may well be imagined, a deep impression. Monsieur Grevy thereupon sought the views of the Assembly. It was decided to adjourn to the offices of the Assembly in order to discuss the proposals as suggested by Monsieur Thiers. An hour and a half later (5.30 p.m.) the sitting of the Assembly was resumed. Monsieur Beulé reported that the Commission had with but one dissentient vote agreed to the following resolution :— " The Assembly, having received with the deepest sympathy the declaration of Monsieur Keller and his colleagues, leaves the matters in the hands of the negotiators, trusting in their wisdom and patriotism."

" That is a blank cheque," cried Monsieur Henri Rochefort ; whereupon many voices were heard replying " What else could we have done ?"

The Assembly then elected Monsieur Thiers chief of the Executive. Monsieur Victor Lefranc thereupon recalled the qualities which entitled Monsieur Thiers to the confidence thus shown in him and urged his colleagues to strengthen Monsieur Thiers's hands by affording him their support with unanimity. On this proposal being put, it was carried by the representatives rising in their places. Monsieur Thiers's colleagues then pressed round him to congratulate him.

The sitting of the Assembly came to an end at 6 p.m. ; the members

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had been deeply stirred and the excitement at the close of the proceedings beggars description.

Monsieur Welschinger tells us that on the evening of the 17th February, 1871, he recorded his own impressions on the situation. He felt certain that had the Assembly been called upon to vote at once on Keller's proposal, it would have been carried without a doubt ; but the time given for deliberation brought out clearly enough that the French Army was no longer in a position to put up a good fight. It has been thought by some that the decision arrived at by the Assembly, on the 17th February, 1871, was imprudent and exhibited a willingness to purchase peace at the price of immense sacrifices. Bismarck is also reported to have taken courage at this demonstration of weakness and it has been stated that, whereas he had been willing to accept Strassburg only and a War indemnity of 80 millions sterling, in consequence of the Bordeaux decision he at once put forward bigger demands ; Monsieur Welschinger definitely states that this was not so, for the Iron Chancellor had, after the refusal of the armistice proposed on the 31st October, 1870, already made up his mind to rob France of both Strassburg and Metz and was most obstinate on the subject. It was alone owing to the patriotic zeal and skill of Monsieur Thiers that the reduction of the War indemnity from 240 millions sterling to 200 millions sterling was secured, and that France was allowed to retain Belfort, Longuyon, Briey, Nancy, Lunéville, St. Dié and Montbéliard, places which the Prussian General Staff wanted (*vide Causes et Responsabilités de la Guerre de* 1870, by Henri Welschinger).

The third chapter deals with the motion tabled by the Deputies for Alsace and Lorraine at the sitting of the Reichstag held on the 16th February, 1874. The motion ran as follows :—

" May it please the Reichstag to decide that the inhabitants of Alsace and Lorraine, who, without being consulted, were annexed to the Germanic Empire by the Treaty of Frankfort, may be called upon specially to record their views on this annexation."

The motion was supported by 14 out of the 15 Deputies for the two Provinces, it came up for discussion at the sitting of 18th February, 1874. At the opening of the proceedings Monsieur Teutsch, Deputy for the Zabern District, and his colleagues requested permission to address the Reichstag in French, but this was opposed by the German Deputy Braun. The President of the Reichstag ruled that in accordance with Article 21 of the Standing Orders the use of German was alone permissible in addressing the Reichstag and invited Monsieur Teutsch to open the discussion in German. Amidst derisive laughter Monsieur Teutsch explained that German was not his mother tongue ; he was continually subjected to interruptions whilst he continued to pour home truths into the ears of his audience of the Reichstag. He declared that Germany had strained her rights in compelling France to sacrifice 1½ millions of her children ; it was indeed sad to see Germany, at the end of a century of enlightenment and progress, setting herself the task of conquering and reducing a whole people to a state of slavery ; the sentiments relating to right and honour were offended by her conduct ; Professor Bluntschli, one of Germany's juridical shining lights, had, in his book on *International Law*, recognized that, in order to make a

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cession of territory incontestable, such cession should first be accepted in principle by its inhabitants; Napoleon III. had always consulted the peoples of a territory before annexing the same; Alsace-Lorraine was irresistibly drawn towards France and nothing on earth could destroy their attachment for her; the Deputies representing Alsace-Lorraine had been sent to the Reichstag to make known the existence of these indissoluble bonds, and to say that if Germany should shut her eyes to the fact and should abuse her victory, the result would only be new wars involving further ruin and fresh victims. The Reichstag, however, received the proposals of Monsieur Teutsch and his colleagues with laughter and vulgar abuse.

The predictions of Monsieur Teutsch and his colleagues have, in spite of the ironical taunts which they met with at the time from the Junkers, come only too true. Germany has since those days remained armed to the teeth and has continued to increase her military forces, imposing a heavy burden on her own people. The attitude of Germany made it necessary, at the same time, for other European Powers continually to adopt measures to defend themselves. The conquered territories have been a source of weakness rather than of strength to their new Rulers; they have with patience and obstinacy resisted all efforts to germanize them. In spite of a *régime* of cunning and hypocritical oppression, German Kultur has proved itself too impotent to make any impression on Alsace-Lorraine so that, in 1914, on the eve of the outbreak of the War, Von Bethmann-Hollweg felt obliged to admit Germany's failure to placate the peoples of these two Provinces. The popular refrain:—

Vous n'aurez pas l'Alsace et la Lorraine,
Et, malgré vous, nous resterons Français.

represents the true condition of affairs even to this day.

The fourth chapter contains the full text of the speech, delivered by Monsieur Teutsch in the Reichstag on the 18th February, 1874. The leading features of it will be gathered from the remarks made earlier in this notice.

Messrs. Winterer and Guerber, the Deputies for Altkirch-Thann and for Guebwiller respectively, had intended to address theReichstag on the motion, but the President refused to call upon them to speak, telling them that three Deputies had moved the Closure. In accordance with the Standing Orders, the Closure was put to the vote and carried. Monsieur Teutsch being, thereupon, asked if he had anything to say, replied: "It has pleased the Reichstag to closure the debate. We appeal to the Almighty and to the judgment of Europe." He was thereupon cried down by Baron Nordeck von Rabenau, the most rabid of the Junker Deputies.

The motion of the Deputies for Alsace-Lorraine was next put to the vote and rejected by an enormous majority; the signatories thereto abstained from voting, in order to mark their disgust at the contemptuous reception they had met with in the Reichstag, and walked out of the building.

The fifth chapter deals with the proceedings in the French Chamber of Deputies and in the Senate on the 5th June, 1917, in connection with

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the interpellation of the Government on its attitude towards the delegates wishing to attend the Stockholm Conference.

In the motion brought before the Chamber of Deputies by MM. Charles Dumonout, Klotz and 65 of their colleagues on this occasion, it was clearly indicated that the question of the restitution of Alsace-Lorraine to France and reparation for the damage done were the War aims which occupied the foremost place in the minds of Frenchmen. This motion was carried by an overwhelming majority amid cries of "Vive la France!" (467 votes for, and 52 against).

The Senate being consulted in its turn on the subject of the Stockholm Conference also passed a resolution; in it the intention was expressed to prosecute the War until such time that the restitution of Alsace and Lorraine could be assured, reparation secured for damage done and guarantees against German militarism obtained. The Premier repeated in the Senate the following statement which he had made earlier in the day in the Chamber of Deputies: "We have wished to remove out of the way all that was equivocal, everything in the nature of a pitfall in the formulas, the birthplace of which though stated to be Petrograd is really situated elsewhere. What is the meaning of this formula, seductive in appearance, whereby a war is to be concluded *without annexations, without indemnities?* Its origin is too apparent, and very simple-minded must be those persons who can allow themselves to be taken in by such formulas!

"We have said: no annexations. Does that mean that we are not to have the right to demand the restitution to us of that which is ours, of this Alsace-Lorraine which had not ceased to be French before the War, during those five and forty years of suffering and grief through which we have lived since that criminal act, since that abuse of force which is one of the causes of the present War, an abuse of force which was responsible for the uneasiness that prevailed throughout the entire civilized universe owing to the outrage committed with comparative impunity against right and justice in 1871?

"There is not a Frenchman, I dare to say, who would accept the proposition or who would dare to admit were he in a position to accept it, that we are not to continue the War for the purpose of regaining that which is flesh of our flesh, blood of our blood, those Provinces which have been torn from us and which will merely be returned to their Motherland! . . . This is what I have said in the Chamber, and this it is that has been received with approbation, by an enormous majority, in that Assembly. The views we have recorded in the motion before you, contain sentiments similar to those which will be found in the note which President Wilson has just addressed to Petrograd. We are in agreement with his high-minded and clear conceptions on the subject. He has himself said: 'Yes, no annexations, no striving after conquests.' But the restitution of Alsace-Lorraine would not, in the minds of the people of the United States of America, be held to fall in the category of conquests; similarly, reparation for damage done would equally be a simple act of justice only. We are then in complete agreement, I can say, with the views held throughout the civilized world. That fact, Gentlemen, constitutes a very powerful force, the value of

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which ought to be appreciated by us, which ought to be borne in mind by us, since by the side of *the material force*, there exists *a moral force*. In this conflict, we have been sustained by the force of the *conscience universelle*, the resultant of all perfect co-existent moral forces, these now surround us and plead for us."

The motion brought before the Senate by the Government was carried *nemine dissentiente*.

Monsieur Viviani, Minister for Justice, on the invitation of the French Premier, addressed the Chamber of Deputies on this occasion on the subject of his recent visit to the United States of America. He described to his audience the warmth of the reception he had met with there.

Later on the same day, he repeated in the Senate, the substance of the account he had given to the Chamber of Deputies of his experiences in the United States of America and explained that the citizens of the great American Republic were heartily in sympathy with the views of all those who desired the restoration of Alsace-Lorraine to France.

The sixth chapter contains the text of the speech made by Monsieur Ribot on the 4th July, 1917, at the American banquet held at Paris on that day. In the course of his speech Monsieur Ribot referred to the question of Alsace-Lorraine and stated that the United States of America was fully aware that no sophism would prevent France from pushing her claims with regard to the restoration of the two Provinces taken from her by an abuse of force and that there was no need for a consultation of any kind in order to revive her title to these territories. He concluded his speech by referring to the solidarity of all free peoples and the admiration in which the United States of America were held in France and continued: "Let us lift up our hearts to the level of the events which are in process of accomplishment. Have faith in justice, in our courage, in our determination to continue the conflict until such time as we obtain not a humiliating peace worse even than death itself, but a peace which holds every right in respect."

Needless to say that this declaration was received with intense enthusiasm.

The seventh chapter deals with the proceedings in the French Chamber of Deputies in connection with the spoliation of the property in Alsace-Lorraine belonging to Frenchmen and those of French sympathies. Monsieur André Honnorat in addressing the Chamber on this subject stated that Monsieur Lazare Weiller had already brought forward a motion inviting the Government to take the necessary steps :—

1. To put a stop, in concert with the Allies of France, to the spoliation taking place of the properties of Alsatians and Lorrainers, who had come to or had remained in France.

2. To remove all suspicion and doubt concerning those Alsatians and Lorrainers whose loyalty to France was beyond question, but who were nevertheless exposed to annoyances owing to the Teutonic accent of their voices and the Teutonic ring in their names.

3. To inspire confidence as regards the future in the minds of Alsatians and Lorrainers who had, whilst remaining in the annexed provinces, continued loyal to France.

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Monsieur Honnorat explained that the French "*Commission des affaires extérieures*" had recommended that the two last clauses of the motion given above should be eliminated. He reminded his audience that the drafts of two laws, dealing with questions relating to change of surnames, were at that time undergoing scrutiny by the *Commission de législation civile et criminelle*. He pointed out that the *Commission des affaires extérieures* desired the Chamber of Deputies to give legislative effect to the first of the above clauses. No new principles were involved therein. It was merely a question of inviting the Government to adopt measures jointly with France's Allies, in order to ensure that the Germans should no longer despoil private property with impunity.

Whilst the measures adopted in France in respect of enemy property have aimed at conservation, the tendency of the action taken by Germany in respect of enemy property has been directly the opposite. Monsieur Honnorat referred in his speech to some of the measures adopted by the German Government for dealing with enemy property and it is evident that, as in other matters connected with the War so also in this, the German authorities have shown a cynical disregard of all recognized conventions on the subject. So much so has this been the case that in certain sections of the Teutonic Press a note of warning has been sounded lest the conduct of the German authorities may result to a resort to reprisals on the part of the Entente Allies. Now that the United States of America has come in on the side of the Western Allies, the German Press fully realizes that should the Entente Powers apply the same principles, as those adopted by the German Government, in dealing with enemy property German interests throughout the world will suffer a blow of so serious a nature that it will take many generations to recover therefrom.

On the 26th May, 1917, the French Government lodged, through the Spanish Ambassador at Berlin, a solemn protest at the Wilhelmstrasse against the measures taken in regard to enemy property by the German Government. It has also considered the question of adopting reprisals.

The eighth chapter contains the text of the speech made in the Chamber of Deputies by Monsieur Lazare Weiller, Deputy for the Charente, and Monsieur Ribot's reply thereto.

On this occasion Monsieur Weiller addressed the Chamber of Deputies on the motion he had tabled inviting the Government to adopt measures for the prevention of the spoliation of the property of Alsatians and Lorrainers who had remained in or had come into France. In a moving speech he touched upon the course of events which had taken place since that memorable day—17th February, 1871—when Emile Keller had lodged with the National Assembly, at Bordeaux, the solemn protest of Alsace-Lorraine against the steps then contemplated of permitting their subjection to a foreign yoke. Monsieur Weiller, at the same time, made a powerful appeal to the Chamber to accept the motion standing in his name.

Monsieur Ribot made a short speech accepting the motion and informed the Chamber that its acceptance would strengthen and increase the authority of the Government. He denounced as intolerable the conduct

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of Germany in dealing with the property of private individuals as it had done, conduct which had caused indignation throughout the civilized world.

On the conclusion of Monsieur Ribot's speech, the first clause of the motion referred to earlier in the notice (Chapter VII.) was put to the Chamber and carried *nem. con.*

The ninth chapter gives a short account of the meeting held at the Æolian Hall, New York, on the 14th July, 1917, under the Presidency of Mr. Myron T. Herrick, an ex-Ambassador, to discuss the Alsace-Lorraine question. On this occasion Monsieur D. Blumenthal, ex-Mayor of Colmar and ex-Deputy of the Reichstag, explained the Alsace-Lorraine situation to his audience. He was followed by Father Clifford, the well-known Roman Catholic Professor at the Columbia University; Bishop Darlington, of the Methodist Church of Pensylvania; Rabbi Wise, of the great Synagogue of New York, who, each in their turn, supported the cause of Alsace-Lorraine and France in eloquent speeches. The free peoples of the world were called upon to enter into a solemn obligation on that fourteenth day of July that they would not cease in their efforts until Alsace-Lorraine had been taken from the "blood-stained hands of Prussia in order to be restored into the wounded arms of France."

The tenth chapter contains a copy, in French, of Mr. T. P. O'Connor's article, dealing with the Alsace-Lorraine question, published in the *Daily Chronicle* for 8th June, 1917, and also a brief reference to the official dinner given by the Alsatians and Lorrainers of London to Monsieur Helmer; Mr. T. P. O'Connor was in the chair on this occasion.

In the *Daily Chronicle* article Mr. O'Connor expresses the opinion that Great Britain was guilty of a crime in deserting the cause of Alsace-Lorraine in 1871 and urges that this country shall not offend again. He describes the heroic struggle of the two Provinces to regain their liberty and considers it a matter for regret that the real history of Alsace is so little known. The measures adopted by Germany to extirpate French sentiment in the two Provinces are briefly touched upon. However, in spite of every effort at repression the French language survives in Alsace-Lorraine, a fact which indicates the tenor of the thoughts of its inhabitants.

On the occasion of the dinner Mr. O'Connor raised a note of warning against the proposal which has been discussed that, whilst Lorraine should be returned to France, Germany might be allowed to retain Alsace. He explained that no greater injustice could be done to the latter than to accept this solution of the difficulty. Alsace, he said, is "as much French as Lorraine, and intends to remain so after a half century of oppression. She hates the Germans."

The tenth chapter contains extracts from the notes made by Monsieur Welschinger, in his capacity of custodian of the records of the National Assembly in connection with the incidents of the 1st March, 1871.

The sitting of the Assembly on this occasion held at the Grand Theatre, Bordeaux, was a very noisy one. Bamberger, Deputy for Metz, made

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an attack on the Empire ; Conti, a former Secretary to Napoleon III., attempted to defend the Empire. This was the signal for an uproar, the terrible storm broke. Conti was thrown from the Tribune, hooted at and hustled. Victor Hugo attempted to protect him ; the President of the Assembly called the members to order by ringing his bell and by word of mouth, but to no purpose. At 2.50 p.m., the sitting had to be suspended. Members ran about in the passages and in the adjacent rooms; the excitement was intense. Finally, about half an hour later the sitting of the Assembly was resumed, an agreement had meanwhile been arrived at with regard to the wording of the motion in which the Fall of the Empire was about to be announced. The motion in question was thereupon read by Monsieur Target ; an impressive silence prevailed. The Empire was held responsible for the invasion, ruin and dismemberment of France. The motion was put to the Assembly and carried, six votes only being cast against it. Monsieur Thiers then addressed the members present and told them that Providence had wished to chastise the Empire for having permitted a War to break out whilst France was unprepared and without Allies. " This is the judgment of the Nation ; it will," said he, " also be the judgment of posterity." He then urged his colleagues to vote the peace preliminaries. Monsieur Keller for the last time entered his protest against the " cursed peace," which was soon to wring the hearts of so many devoted sons of France. Voting then took place on the motion with the following result :—For, 546 ; against, 102 ; abstentions, 22. A tense silence ensued in the hall. Monsieur Grosjean then read, in the name of his colleagues from Alsace-Lorraine, a touching and final protest and withdrew. The hall emptied and the public began to discuss the situation in the Place du Théâtre outside.

The draft of the Treaty and other necessary documents were despatched to Monsieur Jules Faures at Paris by train the same evening, in order to be placed without delay into Bismarck's hands, and at the same time, to ensure that the entry of Prussian soldiers into Paris should be immediately suspended.

The twelfth chapter contains the text of the statement made by Monsieur A. Ribot in the Chamber of Deputies on the 31st July, 1917. In an introductory note, attention is called to the interview Herr Michaëlis gave to the representatives of the German Press at the Wilhelmstrasse on the 28th July, 1917, when, in dealing with the recent speeches of Mr. Lloyd George and of Sir E. Carson, he told them that Great Britain did not desire a " peace by understanding," but one which would involve the complete submission of Germany. Michaëlis stated that France's schemes of conquest were known to him, and also what had taken place at the secret session of the Chamber of Deputies on the 1st June, 1917.

These schemes were intended, he said, to secure to France her former frontier as it stood in 1870, together with the basin of the Sarre and a big slice of territory on the left bank of the Rhine. Michaëlis also stated that Terestchenko, the new Russian Foreign Minister, had protested against France's War aims, which included the conquest of

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Syria, and had threatened that the Republic of Russia would no longer participate in the War unless France renounced her ambitions.

It is not difficult to see through the Chancellor's cunning manœuvre. He wished it to be understood that Germany was willing to renounce her policy of annexations, but found herself awkwardly placed by reason of the schemes of conquest of her adversary. Further, he no doubt wished to bring about a deep cleavage between France and Russia, and lastly, he hoped that the world at large would place the responsibility for the continuance of the War on the shoulders of the Entente Allies. Several of the German newspapers followed the cue that had been given them. We have here again further evidence of Teutonic bad faith, *natum mendacio genus*, for the French Chamber of Deputies had on the 5th June, 1917, whilst mentioning the restitution of Alsace-Lorraine and reparation for the damage done by the enemy, definitely abandoned all schemes of conquest which it might have cherished prior to that date. It is to the remarks made by Michaëlis at the Press interview that Monsieur Ribot addressed himself on the 31st July, 1917.

The German Chancellor, he said, has publicly asked the French Government to state whether it had not, on the occasion of the secret session of 1st June last, informed the Chamber of Deputies that a secret Treaty had been concluded on the eve of the Russian Revolution, wherein the Czar Nicholas had agreed to support French claims to German territory on the left bank of the Rhine.

Monsieur Ribot characterized the version given by the Chancellor of the proceedings in the Chamber as grossly inexact and most untruthful. He informed the Deputies that they were fully aware of what had been said on that occasion. True, the Czar had been asked to support France's claim to the restoration of Alsace-Lorraine, but no question of further annexations of territory on the left bank of the Rhine had been raised. What had been proposed was that an autonomous State should be created on the left bank of the Rhine as a " buffer " between France and Germany. The Chancellor had falsified the sense of the letters exchanged, in February, 1917, between Paris and Petrograd, much as had his most illustrious predecessor done in the case of the Ems despatch. Monsieur Ribot declared his readiness to publish the correspondence in question, should the Russian Government agree to the adoption of this course ; he further charged Herr Michaëlis with having deliberately suppressed the information concerning that part of the policy of the French Government which repudiated conquest of territory.

The statement made by Monsieur Ribot was accepted with unanimity by the Chamber of Deputy ; as it contained the truth, the whole truth and nothing but the truth, no one rose to continue the debate.

The appendices contain :—

(1). An extract from an article published in the *Temps* for 19th July, 1917, dealing with the Alsace-Lorraine question ; it is accompanied by the text of a letter, signed by Louis Blanc and his Republican colleagues, to the representatives of the Departments of the Bas-Rhin, of the Haut-Rhin, of the Moselle, of the Meurthe and of the Vosges ; the signatories

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to the letter express therein their affection for the heroic people of Alsace-Lorraine, and make known their intention to repudiate the provisions of any act, treaty, vote or plebiscite which may cede the whole or any part whatsoever of Alsace and Lorraine to a foreign Power.

(2). The text of a letter dated Paris, 24th February, 1874, addressed by Monsieur Scheurer-Kestner to Monsieur E. Teutsch, just after the latter had raised his protest in the Reichstag.

(3). An article dealing with the attitude of the French Socialist Party towards the Alsace-Lorraine question.

The text of the resolution passed at the Socialist Congress in December, 1915, is given in this Appendix. In the resolution referred to, it is definitely stated that there can be *no durable peace* until the bond between France and Alsace-Lorraine, which the brutality of force had alone severed in 1871, in spite of the protests of the Socialists Bebel and Liebknecht made in the bosom of the German nation itself, is re-established.

And it is further stated in this document that the Socialists of France considered the Alsace-Lorraine problem one requiring solution by reason of the acceptance by them of the doctrine that peoples alone possess the right to dispose of themselves.

The Socialist Party further recall the fact that Alsace and Lorraine voluntarily passed under the sway of France in 1790 and that these Provinces raised a solemn protest in 1871 against their annexation by Germany.

The political history of the two Provinces since the annexation is briefly traced and it is conclusively shown that the sentiments of Alsatians and Lorrainers remain to-day the same as those entertained by their ancestors of 1790. France is not seeking any *annexations* in demanding the restitution of those Provinces, she is simply claiming that effect be given to the *wishes of Alsatians and Lorrainers so repeatedly expressed by them.*

Extracts are given in this Appendix from an article which appeared in the *Temps* for 11th August, 1917, dealing with the reply of the Committee of the United Socialist Party prepared for the Stockholm Conference on the question of the restitution of Alsace-Lorraine to France. In this reply, the French Socialists admit the incontestable right of France to the two Provinces, but they proceed to demand that France shall, in order to provide an illustrious example of the principle that the choice of the flag under which peoples shall live is one for their own free decision, renounce her just claims in order to spare the world from calamities without end.

The *Temps* points out that the proposal of the Socialists amounts really to a demand that France shall be wilfully guilty of a failure in her duty to Alsatians and Lorrainers and that she shall betray the confidence which her unhappy children have not ceased to place in her for six and forty years. France is called upon thus to disown her past and to ignore the moral value of the solemn obligation sealed at Bordeaux by the representatives of the sacrificed peoples at one of the most tragic hours in their history.

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The *Temps* considers that the prudence of the terms and the perfidy of the arguments used by the French Socialists in no way attenuate the abominable character of the decision arrived at by them.

(4). The text of a letter dated 15th August, 1917, addressed to the French Socialist Party by the *Légions des anciens officiers, sous officiers et soldats*, in which they record their strong protest against the adoption of the course recommended by the former.

(5). The text of a declaration by the *Sociétés alsaciennes-lorraines* dated 15th August, 1917. The history of the two Provinces is briefly traced from 1552. It is pointed out that 400,000 inhabitants of Alsace-Lorraine have preferred to quit their native land, during the period 1871—1914, rather than submit to the brutality of their conquerors; that they have continued to reiterate their protests against their annexation; that they have continued faithful to the French language as the vehicle for communicating their thoughts; and that they have persistently refused to recognize alleged rights claimed by their invaders. As time has passed by their repugnance to their Teutonic rulers has increased, and just before the outbreak of the present conflict the governing authorities of Germany had openly to admit that their scheme for germanizing the two Provinces had failed hopelessly. In their declaration the *Sociétés alsaciennes-lorraines* reiterate their demand that the two Provinces shall be allowed their *droit imprescriptible* to choose the flag under which they shall live.

No one can read the volume under review without being deeply impressed with the great importance attached, not only by France but also by Alsace-Lorraine, to a restoration of the relationship existing between them prior to the Treaty of Frankfort.

W. A. J. O'MEARA.

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HAND GRENADES.

A Handbook on Rifle and Hand Grenades.

Compiled and Illustrated by Major Graham M. Ainslie.—(John Wiley & Sons, Inc., New York ; Chapman & Hall, Ltd., London).

This book, which is the result of practical experience in the present war, should prove of value and interest to those who wish to extend their knowledge of the subject from acquaintance with a few types of grenade to an accurate, and, as far as may be got from the printed word, an intimate knowledge of many types ; which, indeed, is its purpose.

Twenty-three grenades, British, French, and German, are illustrated, and more are described. The descriptions given are full and practical : they include type, time of burning of fuze, weight, explosive, safety device, body, striker, igniter, preparation for use, and method of using. In the descriptions of German grenades the following information—important to the unskilled grenadier—is given :—

1. How to make the grenade safe.
2. How to make the grenade alive.
3. How to use the grenade against the enemy.

A list of explosives used in grenades is given, and descriptions of service Fuzes, Detonators, Exploders, and Lighters are included, and the correct manner in which to throw a hand grenade is described.

The constructional details having been given, the practical application of grenades in warfare is not forgotten ; and several pages of the book are devoted to a description of the duties of the individuals composing a Grenade Squad, and the method of Clearing a Trench from a Flank, and a Frontal Attack in Conjunction with Infantry.

J.D.B.

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NOTICES OF MAGAZINES.

REVUE MILITAIRE SUISSE.

No. 11.—*November*, 1917.

FEATURES OF THE BELGIAN FRONT.

What the Belgian Army has done since the Battle of the Yser.

Major Willy Breton, of the Belgian Army, has prepared an article on the Belgian Front; the first part of it appears in the number of the *Revue* under notice; twelve photographic reproductions, giving views of various defence works constructed on this front, accompany the text. The early experiences of the Belgian Army in the present War are recited as an introduction and we can thus follow the vicissitudes of this army from the time of the heroic defence of the frontier fortresses of Liége and Namur; we are successively reminded of the retreat from the Meuse defences, of the brilliant little victory of Haelen, of the retreat from the Gette into Antwerp, of the bombardment of Belgium's great keep, of the sorties therefrom, and finally, of the escape of the remnants of the Belgian Army from Antwerp and of its eventual arrival on the Yser.

Major Breton reminds us that the line of the Yser was not chosen arbitrarily as a rallying ground for the Belgian Army, but because, at the time in question, it was the nearest natural defensive position in which, when reached, this army would be able to link up with the French and British forces, themselves gradually gliding northward, during the "Race for the Sea." It was on this line that the Belgian Army "in rags" and with its effective strength reduced to 80,000 men, viz., 48,000 rifles and 350 guns, helped to keep at bay, during the last fortnight of October, 1914, a German Army of 150,000 men, consisting for the greater part of fresh troops and supported by 500 guns. For the first eight days, the only reinforcements that came to the assistance of the Belgians were some 6,000 French Fusilier Marines; from the 23rd October, 1914, it had also the support of parts of Grossetti's Division.

On the 31st *idem* the Germans were driven from Ramscapelle, and the inundations caused by the opening of the sluice gates by the Belgians about this time virtually brought the Battle of the Yser to an end. The roads to Dunkirk and Calais were now finally barred to the enemy, but, in the meantime, the Belgian Army on the Yser had suffered enormous losses. The casualties amounted to 11,000 killed and missing and 9,000 wounded; and in addition 5,000 men were *hors de combat* owing to sickness. These casualties reduced the strength of the infantry

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to 32,000 rifles; and it was to these men that was confided the honour and duty of continuing the struggle in order to prevent the last vestige of the soil of their Fatherland falling into the invader's hands. For three long years they have held tenaciously on to the front allotted to them, a front which has gradually been extended since the Battle of the Yser. Circumstances have not permitted the Belgian Army to take part in any great "push," but it has come in for its share of defensive warfare, particularly in connection with the German offensive against Steenstraat (April and May, 1915), when the Kaiser's troops were, in spite of the surprise produced by the first use of gas, successfully held up. The main task of the Belgian Army has consisted in strengthening their defences, so as to make their portion of the front, as far as possible, impregnable. The defences constructed by Belgian soldiers in the inundated regions form a model of what strong works should be; not only have these soldiers given a great example of endurance, stoicism and patient application, but they have, at the same time, displayed very considerable ingenuity in dealing with difficult problems in an inhospitable and unpromising region. Their labour and brains have brought into existence an immense fortress covering many square miles of territory.

The Front allotted to the Belgians. The Objects to be Attained. General Conditions prevailing on the Front in Question.

Having failed to reach Calais by breaking through the Belgian front, the Germans next expended their efforts by hammering at the Ypres salient; there also they met with a check. At the time that the operations last referred to were in progress, the Germans simultaneously made a further attempt to cross the Yser and renewed their attacks against the bridgehead at Dixmude, no doubt with the object of retaining as large a part of the Entente troops as possible on the Belgian coast. On the 10th November, 1914, the French and Belgian troops had to give ground and retired to the left bank of the Yser; the ruins of Dixmude thereupon passed into German hands. However, all German attempts to cross the river were frustrated and, after having suffered heavy casualties, the invaders eventually desisted in their attacks in this region.

Winter brought operations practically to a standstill; both sides were now fairly exhausted and set to work to recuperate, and to strengthen their defensive arrangements. But taking advantage of their superiority in artillery on the front held by the Belgian troops, the Germans continued their efforts to destroy and to demolish the Yser defences and to reduce to ruins the villages used for billeting the Belgian troops. One by one the villages in question were reduced to shapeless masses of bricks, stones and dust.

It is in this ruined region that the Belgian Army, reorganized after its trying experiences, was at work, during the bitterly cold days of the winter of 1914, in raising the solid ramparts against which the enemy has been knocking and wearing itself out in vain since those early days of the War.

The front originally held by the Belgians stretched from Nieuport to the old fort of Knocke, at the confluence of the Yser and of the

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Yperlee. It was later extended first to a point just N. of Steenstraat and then to Boesinghe. Finally, a front of about 20 miles was assigned to the reconstituted Belgian Army. In view of the relatively weak numbers available, the Belgian soldiers have had a very strenuous time; although the inundations, which covered a great part of the Belgian front, hindered the enemy, for a time, from making serious attacks on the Yser line, nevertheless, at other times, the ice in the inundated region rendered the protection of the waters illusory. Great labour and skill have also been involved in controlling these waters, so that whilst the enemy might be caused to suffer the greatest inconvenience from the inundations, yet, at the same time, these waters should be prevented from invading the Belgian trench system to such an extent as to render the latter untenable.

Major Breton points out that it is a mistaken idea to assume that the inundations form an impassable obstacle. The roads, the small humps in the ground and the farms constitute causeways and islands which all offer advantages to an attacking enemy. Thus it is that, from the earliest days, Belgians and Germans have been disputing for the possession of the several points of vantage in order to hold them as advance posts for the purpose of covering their respective main lines of defence.

The ground about Dixmude being above the water level, the Belgian and German defences were brought close up together in this locality and were separated alone by the width of the Yser, some 15 to 20 yards only. For this reason exceptionally strong works had to be provided by the Belgians in this neighbourhood. Similarly, owing to the fact that the Belgians naturally wished to keep the sluices at Nieuport in their hands, they set to work to construct a formidable bridgehead at the place last mentioned, and have rendered it, as far as possible, proof against all attacks.

South of Dixmude, the Belgian and German defences were actually on the banks of the river opposite one another, except where the inundations caused them to be separated to a greater extent.

The defence arrangements of the Belgians had the following two-fold objects in view:—

(i.). To make the left wing of the Allied front in the Western Theatre as secure as possible; thus to bar the approaches to Dunkirk and Calais.

(ii.). To retain a hold on Belgian soil; a matter of political as well as of military importance.

It is the importance of the duties allotted to the Belgian Army that accounts for the fact that the *morale* of its soldiers has been maintained at a high standard and that privations have been suffered by them without any complaining on their part.

Major Breton deals in some detail with the organization of a Belgian defensive sector. He reminds us that the power of modern artillery and of high explosives render it necessary to organize defence arrangements in a *zone which has considerable depth*, so that there may be *several successive positions*. Further, each position should consist of a series of defensive lines a short distance apart and should be provided with

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all the necessary accessories. The weaker a position is naturally, the more elaborate must be the works provided for its defence.

The Belgian defence works nearest to the enemy are as a rule continuous; farms, woods, villages, etc., in these positions being converted into *points d'appui* in the general line. Communication trenches, providing complete cover from view, connect the various portions of the several positions and their successive lines together. Numerous bombproof shelters have been constructed so as to provide cover during bombardments and also for use as sleeping accommodation in inclement weather. Particular attention has been paid to the provision of emplacements for machine guns, for trench mortars, and for mine-throwers. A considerable amount of trench railways have been laid and an immense telegraphic and telephonic network has been installed throughout the defensive zone.

All who have had anything to do with that part of the Franco-Belgian frontier region between the sea and the Yser, known locally as the "Veurne-Ambacht," are aware of the peculiar difficulties involved in providing for its defence. It took centuries to reclaim the wastes in this region. To provide for the flooding of these pasture lands during the winter and for their subsequent drainage in the spring, the fields are surrounded by irrigation channels, known locally as "Vaarten" or "Grachten," 10 to 13 ft. wide. The only place of importance in this region, apart from Nieuport and Dixmude, was Furnes.

The "Veurne-Ambacht" is very poorly provided with communications. The only railway in this district, apart from the one connecting Nieuport and Dixmude and the few unimportant light railways, is the single track line connecting Dixmude and Furnes with Dunkirk and this is without any platforms or sidings. Roads are equally scarce in this region; the only first-class ones being those connecting Nieuport and Loo *viâ* Ramscapelle and Oudecapelle and the main road from Furnes to Ypres.

Owing to the very open nature of the country, it has been possible for the Germans to keep themselves fully informed as regards the defences constructed by the Belgians.

General Description of the Works Constructed.

The impossibility of digging to any depth below the surface of the ground on the Yser front accounts for the special features of the defences constructed by the Belgians. In place of the deep and narrow trenches, provided on the British and French fronts, with which the technical literature of the War has made us familiar, there abound on the Yser line great ramparts constructed above the ordinary level of the ground out of material which has had to be transported to the sites of these works at great labour and risk. It is behind these *ramparts*, erroneously spoken of as *trenches*, that the Belgian soldiers keep watch and ward Many thousands of sandbags, barrels of cement, rails, logs of timber, etc., have been used in the construction of the works in question and a very good idea of the character of these defences can be obtained by an inspection of the photographic reproductions which accompany the text of the original article. It required many weeks to complete these works; indeed, it was not till after the Battle of the Yser had ter-

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minated that they acquired their present strength, and it was not till then that the Belgians devoted themselves to the improvement of their communications, by the construction of new roads and light railways, in this region.

(*a*). *Control of the Inundations.*—At the time that the Germans crossed the river at St. George, at Schoorbakke, at Tervaete and near Oud-Stuyvekenskerke, it was not straightway possible to regulate the inundations so as to inconvenience the enemy alone; in consequence, the water invaded the Belgian *trenches*. It therefore became necessary, without delay, to put in hand works for the purpose of regulating the flow of water. Very great technical difficulties were successfully overcome by the Belgian Engineers in dealing with this problem and finally it became possible to flood the *enemy* zone, without allowing water to enter, simultaneously, the *friendly* zone. Naturally, steps had, at the same time, to be taken to prevent the Germans lowering the level of the water in the *enemy* zone and also to render it impossible for them to flood the *friendly* zone. Barrages, many kilometres in extent, have been constructed; they are of two kinds, viz., *fixed* and *movable*.

(*b*). *Trenches.*—The defences on the Yser had to be constructed at night. The working parties had, in consequence, trying times in marching to and from the localities where they were employed owing to the wet and sticky mud and to the existence of shell-holes on the narrow routes which had to be followed. Considerable precautions had to be taken so that the enemy should have no inkling as to the parts of the Belgian front on which work was actually in progress. Engineer Parks were established at various points and from these points the materials and tools had to be carried to the site of the works by the working parties, which often incurred casualties, since the enemy used to light up the ground by parachute flares and then to turn machine guns on to the ground lit up by them. The trench system on the Yser front has an extent of 249 miles and it is estimated that over 4½ million yards cube of earth has had to be transported for its construction.

Many miles of bridges have also had to be constructed over the inundations separating the several parts of the Belgian trench system; a view of one of these bridges is reproduced in the *Revue*.

INDIVIDUAL INSTRUCTION OF THE BRITISH SOLDIER.

It is stated that extracts from an article entitled *Une école d'infanterie britannique en France*, by Lieut. Bédier, of the 338th Infantry (published in the *Correspondant* for 25th February, 1917), have been distributed in pamphlet form to Swiss officers. The study of the contents of this pamphlet is strongly recommended. It is said that the British, being a practical people, have arranged for the instruction of their soldiers, after three years' experience of War, on lines providing for that which is necessary and essential alone to be taught, whilst that which is unnecessary and unessential has been rigorously excluded from the training programme. The programme of instruction, it is stated, contains much that is of interest to the Swiss Army, which still retains many obsolete customs and ancient usages which require to be revised and in some cases abandoned.

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Medicine and Surgery in War.

The author of the original article is of opinion that soldiers, from the general to the private soldier, do not, at the present time, attach to matters affecting medicine and surgery the importance that is their due. It is urged that the attention of the Higher Command should not be directed exclusively to plans for the destruction of the enemy's Army, but should also concern itself with measures for imposing the will of the country on an enemy at the termination of a conflict.

A campaign is futile which comes to an end simply by reason of the drain on combatants exhausting the man-power of a nation. *Briefly*, the following should be the aims of a commander in the field :—

(*a*). To destroy as much of the enemy's war material (*e.g.* rifles, guns, supplies, munition factories, etc.) as possible.

(*b*). To kill or neutralize as large a part as possible of the combatants of a hostile army.

(*c*). To maintain at the highest state of efficiency the weapons and tools in the hands of one's own soldiers ; to increase the same and to improve their value by manufacture, adaptation, purchase.

(*d*). To protect, tend, recuperate the *personnel* of the fighting forces, of the reserve, and of the auxiliaries (*e.g.* military non-combatants, munition workers, etc.).

It is in respect of the last mentioned of the above duties that responsibility almost wholly properly belongs to the medical services.

Every collective social act should be systematized ; all general acts tending towards a single end should be co-ordinated. Hitherto, army surgeons have been inclined to direct their efforts in a too individualistic manner. Practical experience has taught the Allies, from a long experience of War, the value of co-ordination in the work of destroying the enemy's forces. They can but wish to have uniformity and co-operation in the work of conserving, protecting and recuperating their own forces.

During the past three years an immense amount of medical and surgical experimental work has been carried out on all fronts ; experimental work of very great value to the medical profession. It is desirable to bring together all the knowledge thus obtained, to compare, to examine, to analyze the same with a view to separating out those parts which may, so to say, contain universal laws. Every doctor, every surgeon, or at least every school, has methods and processes of its own, someone among each of these must, it is thought, be the best and should therefore be generally adopted.

The question of the precautions to be taken to prevent the infection of wounds is discussed in the original article. It is suggested that at the advanced dressing stations such treatment only should be accorded the patient as will provide against his wounds from coming into contact with foreign bodies ; the patient should then as soon as possible be removed to a Clearing Centre. It is at the Clearing Centre that the treatment of the wounds should first be fully taken in hand, the patient's blood examined, etc., and such measures adopted as the nature of the wounds and the condition of the patient justify.

The necessity for consultations in connection with injuries of various

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kinds is urged; it is pointed out that it is in this way that the army doctors will be put in a position best to carry out their responsibilities in connection with the conservation of the efficiency of their own army; they will thus be able to help their country to impose the will of its people on the enemy.

NOTES AND NEWS.

International News.—The German Press, it is stated, has been trying to pick a quarrel with Switzerland. The quarrel has already passed through two phases. The first phase consisted in the *Lokal Anzeiger* alleging that Monsieur Ador, of the Federal Council, had, in stating that the peace of the future must be based on justice and right, been guilty of an offence amounting to a breach of neutrality and that he should therefore be called upon to resign. The Swiss people were at first surprised and later amused at this attack on one of the members of their Government. The Swiss Press took up the attitude that the choice of the Federal Council was a matter that concerned the Swiss people alone and was one in which foreigners had no right to dictate a course of action. Subsequently an official note was published stating that the article in the *Lokal Anzeiger* had not been inspired by the German Government; this explanation was accepted and the incident was allowed to drop.

The second phase followed quickly after. The Imperial Press next sought as a pretext for a quarrel the attitude of the Romande Swiss, which according to the German formula is hostile. This attack led to a long-drawn controversy. The German Press hoped to divide the Swiss people into two opposing camps, but this manœuvre failed.

Dealing with the recent Austro-German offensive against Venetia, the opinion is expressed that in spite of the serious mistakes of the Entente Powers in connection with the Italian campaign, it is hardly likely that the Central European Powers will obtain any decisive political results out of their temporary success. It is felt, however, that under the present circumstances the Austro-Germans may consider it worth while to violate the neutrality of Switzerland. Switzerland continues strategically to cover the rear of the Italian Army; it played the same part in relation to the French Army during the operations on the Marne. Sad to say, Switzerland also protects the German left flank and it also protected the Austrian right flank during the Italian offensives in 1915 and 1916. Although the German Press has not been satisfied with the neutrality that the Swiss have continued to observe throughout many trying months, nevertheless the Swiss people have a clear conscience; they have faithfully and with scrupulous care carried out the international obligations imposed upon them by treaty.

The number of the *Revue* under notice concludes with bibliographical notices relating to works of military interest published recently; a list of works received for review is also published.

No. 12.—December, 1917.

EDITORIAL NOTE.

The Editors of the *Revue* point out that, in spite of the unpropitiousness of the times, the programme which they undertook to carry out

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during 1917 has been faithfully followed by them ; one article promised, that on the naval aspect of War, has alone not been published and this omission has been due to the illness of the author.

Times are still hard and costs have gone up in every direction ; however, the Editors hope to overcome the obstacles in their way and trust that the high standard of their publication will be maintained during 1918.

It is pointed out that Switzerland is passing through a crisis, one which is of a twofold nature. On the one hand, there is the anti-militarist danger, the tendencies of which are of a distinctly anarchist order ; on the other hand, there is a schism in the ranks of Corps of Officers. Both these factors increase the difficulties which the Editors have to contend with at the present time. It is proposed, as during the year 1917, to devote particular attention in the issues of 1918 to matters of interest connected with the Great War.

Features of the Belgian Front.

Work done by the Belgian Army since the Battle of the Yser.

(c). Works of a Technical Order.

The article by Major Willy Breton, of the Belgian Army, dealing with the defence works on the Belgian front, begun in the November number of *Revue* (*vide* page 186 of this issue of the *Journal*) is continued and concluded in the number under notice. A map of the region occupied by the Belgian Army accompanies the text of the original which is illustrated by six photographic reproductions. Major Breton points out that the greater part of the defence works dealt with in his previous article were executed almost entirely by infantrymen, whilst the works of which he gives some account in the article under review are those which have had to be executed by technical troops, *e.g.*, by Engineer units, by sappers and miners, by bridging *personnel*, by telegraph troops, by railway troops, etc. The Belgian Field and Heavy Artillery have, as the number of their pieces increased, constructed their own gun emplacements and the accessories thereto.

Summarized accounts are given under seven heads of works of a special nature :—

1. *Shelters, Redoubts, Concreted Defence Works.*

2. *Communications.*—The region occupied by the Belgian Army was particularly destitute of railways. After the Battle of Flanders (October and November, 1914) the incessant movement of troops, hostile bombardments, and the inclement weather caused the roads in this region to become almost impassable. In order to facilitate the supply services, it became imperative to repair these roads, and to provide new railways. Special units were organized to deal with the communications ; they have constructed some 110 miles of railway of normal gauge, in addition to some hundreds of yards of trench railway.

The Belgian Engineers have constructed many miles of trestle bridging, hundreds of bridges and thousands of culverts. The roads fit for vehicular traffic newly made or remade by these troops have a total length of 250 miles, and the use of half a million tons of stone and a similar quantity of sand have been involved in their construction.

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3. *Miscellaneous Works.*—In this category are placed works connected with the housing of troops and standings for animals.

In order that the targets for the enemy's artillery and aircraft should be as small and as inconspicuous as possible, the accommodation provided for the Belgian troops in the occupied area of Belgium has been split up into small units.

Among other things bombproof aid posts and operating rooms have been constructed in forward positions, whilst at the same time immense hospitals have been erected in the zone immediately removed from that in which actual fighting is in progress.

The demands of the Aviation Service for aerodromes, repair shops, etc., have been on a huge scale; these have all been satisfactorily met.

4. *Artificial Screens.*—The losses inflicted by the enemy on the Belgian troops were at one time very considerable owing to the almost complete absence of cover in the plains occupied by them. This has necessitated the provision of a very considerable amount of work, running into many thousands of square yards, in order to screen the troops from view.

5. *Water Supply.*—By a singular irony the Belgian soldier, whilst living in a region where he sees himself surrounded by water on every side, would have died of thirst or disease had not special arrangements been made to provide him with potable water. Very great precautions have had to be taken to prevent the drinking water obtained from the wells sunk in this region becoming contaminated; in some cases these wells have had to be sunk to a depth of some 400 ft., and more, to reach the strata bearing potable water.

6. *Telephone Network.*—Some idea of the magnitude of the work carried out in providing telephonic communication on the Belgian front can be gathered from the fact that the mileage of the conductors laid amounted in the summer of 1917 to 13,610 miles, whereof 4,100 miles consisted of buried wires.

Some 8,000 sets of telephone apparatus were in use in connection with this system.

7. *Artillery Emplacements.*—At the outbreak of War the Belgian Army was provided with but a limited number of field pieces (75-mm. guns) and about a couple of dozen 6-in. howitzers. After the Battle of the Yser great efforts were made to increase the artillery armament of the Belgian Army in numbers and in weight. By degrees a very imposing artillery force has been raised and armed, and this has entailed the construction of an enormous number of gun emplacements with concrete shelters for the *personnel.*

Conclusion.—Major Breton in conclusion points out that a mere letterpress description of the work carried out on the important route of advance of the German forces on Dunkirk and Calais can convey but a very inadequate idea of the immense labour entailed in constructing the same in a most inhospitable region. Moreover discretion has imposed a deep silence in relation to much of the work carried out on the Belgian front.

In spite of the fact that the Belgian Army has for many months now had to play a purely defensive *rôle*, the men still possess high spirits.

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Neither the elapse of time nor their hard experiences have in any way tamed them; they are still filled with a burning desire to chase the invaders from the ravaged territories of their Fatherland.

The Italo-Austrian Theatre of Operations.

The article on the above subject begun in the number of the *Revue* for April, 1917 (*vide R.E. Journal* for August, 1917, *et seq.*), is continued in the number of the *Revue* under notice. A sketch map accompanies this contribution, which was prepared about the date that the Battle of Bainsizza took place. At that time the success of the slow but constant pressure of the Italian offensive promised to afford the Italian General Staff an opportunity to undertake further offensive operations under favourable conditions.

During the preliminary actions of 1915 the Italian Army may be said to have been studying, so to speak, modern war on the plains and in the mountains, to have been improving the training of its troops and to have been perfecting its equipment. The next phase, that of 1916, was that of the Austrian offensive in the Trentino, so rich in lessons, followed by the vigorous counter-attack on the Isonzo by the Italians, which gave the latter possession of this river line S.W. of Gorizia. In the autumn of the same year much activity prevailed in the Alps; first on the Pasubio, later on the Carso. During the spring of 1917, the Italians extended their activities into the region N. of Gorizia; the operations undertaken by them reached their culminating point in the capture of M. Cucco-Vodice and the attacks on the advanced positions of Hermada.

It is to this last-mentioned phase of the War that the article under review is devoted.

It was on the morning of the 19th August, 1917, that, after an intense bombardment, the Italians launched their attack, properly so called, between Plava and the sea, on a front of more than 37 miles. The *terrain* in this region is broken up by a series of obstacles; it is of a most difficult nature, mountains and rivers abound, roads are few, rocky masses are plentiful; and to the obstacles of nature had been added the most formidable artificial defence works of all kinds that the art of the Engineer was capable of devising. The difficulties in connection with the carrying out of an attack in such a region are too apparent to need any comment.

The features of the Bainsizza plateau consist in a combination of those of the Carso and of ordinary mountain regions. The Carso forms, so to speak, the southern bastion of the defences of Gorizia and M. San Gabriele its northern bastion; the latter at the same time serves as the boundary of the plateau and as an obstacle on the front Ternova-Chiapovna.

M. San Gabriele possesses the features of a supporting point capable of an all-round defence. From its culminating point (about 2,120 ft. above sea level) four spurs spread out fan-fashion, as follows:—

1. In S.E. direction, the spur from M. San Daniele to Zoerenz, parallel to the Ravnizza-Ternova road.

2. In S.W. direction, the spur from M. San Gabriele to Tivoli (E. of Gorizia).

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3. In N. direction, the spur from Veliki Hrib to Britof.
4. In N.E. direction, the spur towards Ravnizza.

Extensive defence works had been provided on each of these spurs by the Austrians on the latest approved models, and the approaches had been well covered by numberless machine guns disposed so as to bring the whole region under cross-fire.

The features of the northern part of the Bainsizza plateau are similar to those of the Carso. To the west of it flows the Isonzo, where the Austrians had entrenched themselves along the left bank of the river from Auzza to Britof, at a short distance from the Italian defences. The Austrian first line was covered by their defences on the rearward line Semmer-Verh-Cucco-711-Jelenik. A retrenched position had also been provided connecting the heights of Jelenik and Kobilek, the Austrian defences being completed by linking these up with the works about Madoni. To the east of the plateau lay the Vallone Dichiapovano, and to the north the Avscek rivulet which flows into the Isonzo, W. of Auzza. Part of the defensive system between Plava and M. Santo had fallen into Italian hands during the May offensive.

The Italians had recognized that before undertaking an attack on M. Santo and M. San Gabriele, it was necessary for them to be masters of the Bainsizza plateau. The operations for which they made preparations were a sudden attack on the river line, the transfer of troops across it and finally an attack in a mountain region on a bastion, which had been provided with elaborate defences.

The crossing of the river N. of Anhovo by the Italians will ever remain a memorable event in the annals of military history; the restrained reference thereto in the official communiqué only tends to enhance the skill and valour of those who were responsible for planning and carrying it through.

Between Anhovo and Auzza the river flows in a deep ravine, as between walls. It had been crossed at Bodrez by the Bergsaglieri.

The Austrian defences were constructed along the river bank. In rear of the trenches, redoubts had been provided at intervals; communication trenches led therefrom to the river. The whole region was well swept by fire and at night the ground was illuminated by large numbers of searchlights.

The Italian artillery kept up a lively bombardment of the Austrian defences; meanwhile, during the night, bridging material was brought down to the river bank. The river having been bridged, the Italian infantry quickly crossed it and obtained a footing on the far bank. The first phase of the attack had therefore succeeded and the Italians were placed in a favourable position for their next offensive thrust. The Austrians put up a very good fight and inflicted serious casualties on the Italians on the front between Bodrez and Loga. S. of Bodrez, as at Anhovo, fortune favoured first one side and then the other. However, finally the river was bridged in 14 places and the Italian columns of attack on the left advanced towards the line Semmer-Fratta and those on the right towards Jelenik.

On the evening of 19th August, the issue was still in the balance; the Italians had not succeeded in seizing Jelenik. On the day following

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the Italian attacks N. of Fratta attained their object. The Italian Artillery now increased the intensity of its fire in a N.E. direction and held up every Austrian counter-attack ; meanwhile the Italian columns marched southwards, reached the Verh plateau, shook the defences of Jelenik and isolated M. Santo, where the Austrians surrendered.

Finally, the whole of the Bainsizza plateau fell into Italian hands in consequence of the enveloping move made by the left wing of their 2nd Army. But to complete their success it was necessary that the Italian 3rd Army should co-operate actively further south ; this was done.

The capture of the plateau constituted a very important victory for the Italians ; it resulted in Tolmino being cut off from M. San Marco.

The 3rd Army very effectually supported the 2nd Army by the attacks it delivered in the region of Hermada and Gorizia. By hard fighting the Italians were able, by the 1st September, to straighten their line near Raccogliano, N. of Castagnevizza. On the south, the line was pushed beyond Selo and extended to Flondar. At the date last mentioned, the Italian advanced positions on the Bainsizza plateau lay on the line Mesniak-Kal summit—Volnik—E. Zagorje-Salcano.

However, the Italian victory was by no means decisive, although the results gained were exceptionally important. The Austrians were no longer in a position to attack on the Carso and their right flank was exposed. They not only lost a valuable *point d'appui*, large quantities of stores and many men, but their *morale* was also considerably shaken.

Equilibrium could only be established on this front by the Austrians undertaking a counter offensive with all their *available forces*, since the Italians had acquired a position which put them at a great advantage.—(*To be continued*).

Death of Colonel Audeod.

The Swiss Army has recently had to deplore the loss of Colonel Alfred Audeod, who succeeded to the command of the 1st Army in December, 1912. Colonel Audeod was born in 1853, and at first studied law. But, in 1876, he decided to adopt a military career and was commissioned as a Lieutenant in the 10th Battalion of Infantry. He joined the Staff in 1887 and, in 1908, was appointed to the command of the 1st Division. He was a frequent contributor to the pages of the *Revue Militaire Suisse*. Colonel Feyler in an obituary notice points out that the deceased officer possessed quite exceptional merit ; this was so fully recognized that nobody thought of entering into a discussion on the matter. The confidence in Colonel Audeod was as great in the ranks of the civil population as in the Army. Two circumstances were responsible for this state of affairs ; firstly, the profound knowledge he possessed of matters pertaining to his profession and the fact that he did not allow himself to be trammelled by formalism and matters of routine ; secondly, his personal qualities, which were such as to cause not only professional men, but even the man in the street to be interested in him. He displayed great tact in his dealings with civilians as well as with soldiers ; such is the explanation of the widespread nature of the regret caused by the death of Colonel A. Audeod.

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NOTES AND NEWS.

Switzerland.—A question of considerable military interest is now before the Federal Chamber; a project is on foot to revise the Swiss Military Law of 1907, in order the better to secure the supremacy of the Civil Power over the Military Authorities. The principle involved is acknowledged to be sound; in the same way that strategic plans must be subordinated to the requirements of the political aims a government have in view, so a general and his staff must act in subordination to the political authority that has placed the national forces under them. But care should be taken, it is pointed out, not to push this doctrine of subordination of the military to the Civil Power to such extremes as to fetter the action of generals in the application of the technique of strategy. The contributor of these notes feels that another law, another text, another terminology are incapable by themselves alone of bringing about a change in matters of essential importance. Further, the nomination of honest men to the chief positions in an administration is not alone sufficient to ensure that things will work smoothly and well; it is also necessary (1) that these honest men shall possess above all things character and (2) and their characters must be such that compatibility shall be assured when problems requiring co-operative treatment are being dealt with.

Should the changes in the law which are contemplated bring about harmony, this will be a distinct gain. However, until experience has demonstrated the value of the proposed changes, those who possess a practical turn of mind rather than a nature easily hypnotized by sonorous sounding phrases are advised that they had better maintain their attitude of scepticism regarding the benefits likely to follow from the labours of the Swiss legislature.

Rumours are afloat that a reorganization of the Swiss Army is also in contemplation; reformers are anxious to apply the lessons of the present War. The hope is expressed that the measures that may be adopted will not show any leanings towards servile imitation of things foreign. The principle to be borne in mind in any reorganization can, it is suggested, be summed up in the words: "Adapt, but don't copy; mould the form on the spirit."

It is stated that whilst civilized peoples of many nationalities and many colours are fighting and sacrificing their lives on behalf of their Fatherland or that of others; striving after hegemony or after liberty; endeavouring to obtain or to retain worldly possessions; struggling to secure their material ambitions or their idealistic aspirations, the Swiss continue to discuss the subject of "drill," "correct drill," "incorrect drill," "educative drill," etc. Attention is called to a brochure entitled *Gegen den falschen Drill*, by Lieut. Rieter, a young Swiss officer. The author stigmatizes therein those who are continually losing themselves in a maze by becoming involved in useless minutiæ or are allowing themselves to be overwhelmed, owing to their devotion to superfluities, by reason of the fact that they do not understand that the object of drill is not to produce external effects, but to develop the soldiers' intelligence in such a way as to habituate him to execute in the best manner

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possible and without hesitation any movement which his commanding officer may order.

Satisfaction is expressed at the Winter Exercises recently carried out by the Swiss Cavalry. This number concludes with an unusually long *Bulletin Bibliographique*. Many of the books reviewed deal with the present War.

W. A. J. O'MEARA.

RIVISTA DI ARTIGLIERIA E GENIO.

October—November, 1917.

BELGIUM.

Armoured Automobiles.—Referring to the differences between the more recent English and French *tanks* mentioned in the *Rivista*, Vol. II., p. 294, and those of the Germans, notice may be made of the Belgian armoured cars which are constructed only to run on roads, and for which there are not many occasions in which they can be employed in trench warfare. Cyclists disperse in all directions for reconnaissance; the motor-cyclists in one with the armoured cars, that advance only when the cyclists have proper information on the strength and the position of the enemy.

GERMANY.

It was stated in this *Review*, Vol. I., 1917, p. 98—100, that the Germans during last winter had employed against Russia in the regions of the lakes near Bardnovitchi armoured cars similar to the English *tanks*. They now deny the pretended inefficiency of this new means of attack, as proclaimed unanimously by the German Press when the *tanks* appeared for the first time on their western front on the Somme.

A recent correspondent of Rotterdam in the *Neue Zürcher Zeitung* states that they have again made their appearance in Flanders as armoured cars differing somewhat from the English *tanks*, being constructed on the same principle for traction as the types with caterpillar belts which can overcome obstacles and even trenches.

He adds that the German armoured cars are armoured with a 75-mm. field gun, and several mitrailleuses; the armour covers the whole of the automobile including the wheels; a small commanding tower surmounts the body of the car.

Conductors of Compressed Celluloid.—The *Frankfurter Zeitung* states that there have recently been adopted in Germany in the chemical offices and the mines, conductors of compressed celluloid. The new material is absolutely impermeable and much lighter than iron; it can be cleaned like wood, and resists chemical action better than iron; it is a bad conductor of heat, but does not require any special arrangements for protection against cold. The tubes serve well for conducting hot or cold air, and corrosive gas which rapidly consumes the iron tubes, but they cannot be used for conducting steam.

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It may be noted that this adoption has not the character of novelty; notices in the English and American periodicals make mention of conductors constructed from fibres and other analogous substances.

VARIOUS STATES.

Employment of "Stellite" for Tools for the Manufacture of Projectiles.—According to notices from several sources recorded in *The International Military Digest*, the use of stellite for the tools used in the manufacture of projectiles is extending, the results being very superior to those obtained by the use of steel. Stellite was invented about four years ago in the United States by Elwood Hayes and is an alloy composed chiefly of cobalt and molibdena, or of cobalt and chromium, or of three metals in different proportions with an admixture of manganese and other metals. The points only of the instruments are made with this; they are heated electrically, and the body of the instrument or tool is made of common steel.

The advantages of this alloy are its hardness that remains at any temperature even when the metal is red hot; and its resistance to oxidization.

As an example of the superiority of instruments pointed with stellite in these times of intense production of munitions it is reported from the foundry of Gobelin's of Paris that by substituting stellite for steel they succeeded in raising the general production from 120 to 200 projectiles of 155 mm.

By using stellite in the manufacture of 1,000 shells of 155 m. the gain amounted to 0.30 lire per shell.

The quality of this alloy varies according to the proportion of its components. By gradually increasing the quantity of molibdena, stellite always becomes harder, and even serves for cutting deeply into glass.

The analysis of typical stellite gives the following results:—

Cobalt	50.50″
Molibdena	22.50″
Chromium	10.77″
Iron	3.11″
Manganese	2.04″
Carbon	0.87
Silicate	0.77
Sulphur	0.084
Phosphorus	0.04
Traces of other bodies	0.316
	100.000%

Stellite has a white silvery colour and is insoluble in nitric acid, and is only slightly affected by hydrocloric acid.

E. T. THACKERAY.

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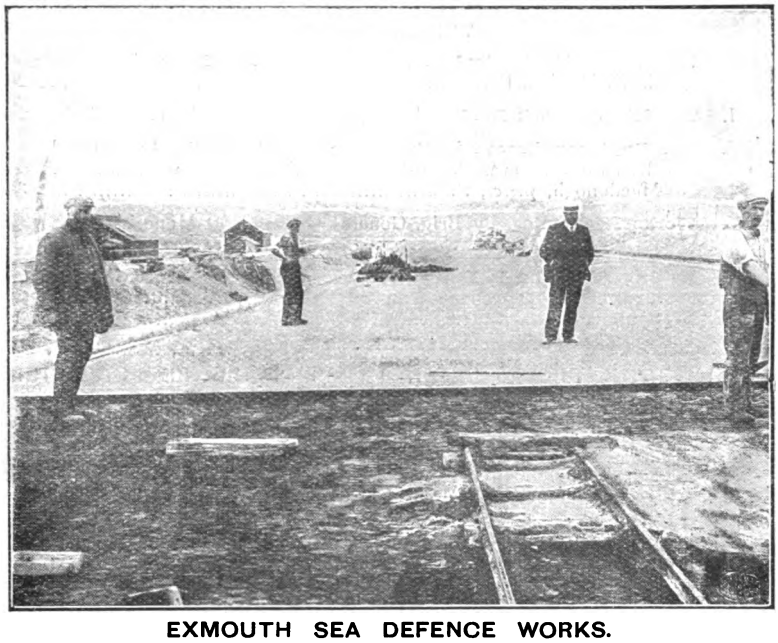

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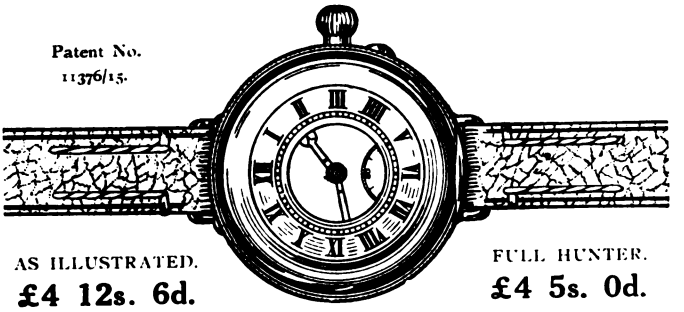

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"FOREST PLANK" ROADS.

By MAJOR P. G. JOHN KEENAN, N.Z.E.

ONE of the great, if not the greatest, factor of success in offensive operations at this stage of the War in France, is undoubtedly "roads." Happy indeed is the Corps Commander who, having completed his arrangements for a "push," is assured by his C.E. that the roads forward are completed; and that guns and ammunition will be up to support the advance, together with engineer stores to consolidate the position when torn from the enemy, and last but by no means least—that food and water will be forthcoming for the troops in their new front line.

The many difficulties in the way of efficient repair of the wonderful pavé roads of France, immediately behind the front line, are obvious. Road metal is scarce, and the difficulty of transporting it by motor lorry over heavily congested roads, puts ordinary methods of road-making out of the question. Hence, the forest plank road, which has, so far, stood all tests satisfactorily, where it has been well and truly laid.

It should be clearly understood that the writer lays no claim whatever to the method; but having served on several fronts since 1914, he has found none to compare with it, up to October, 1917, when he helped to lay down several hundred yards of it at ——.

MATERIALS REQUIRED.

Rough forest planks, 10 ft. by 10 in. by 3 in.
Split pit props of at least 6-in. diameter.
Nails, 6-in.
Sandbags.

TOOLS REQUIRED.

Hammers, heavy.
Saws, rip.
Tapes, tracing.
Mauls, heavy.
Picks and shovels.

The best plan is to divide your working party of Pioneers or Infantry into three :—

1. Drain-cutting party.
2. Formation.
3. Carrying party.

Wherever possible, lay the plank road over the remains of the old pavé, which ensures some sort of a foundation. There were two methods in use at ——.

(*a*). Single roadway, 10 ft. wide, with crossing points about every 200 yards.

(*b*). Double roadway, 20 ft. wide.

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As for many reasons that are obvious, the double road is the best, and in the end saves time, it has not been considered worth while to bother with (*a*).

FORMATION.

No. 1 Party is put on to cutting the side drains 5 ft. wide and 5 ft. deep, on either side of the formation, leaving a berm of 5 ft. on each side of the roadway, thus making a total width of formation of 30 ft.

No. 2 Party drains all shell holes into the side drains, and fills holes with rammed earth, or preferably—with filled sandbags. This party also beds the bearers flush into the formation, in readiness for the Sappers to nail down the planks to them.

No. 3 Party is employed carrying planks—two men to each plank—from the dump, which should be pushed up as near the job as possible, by lorry.

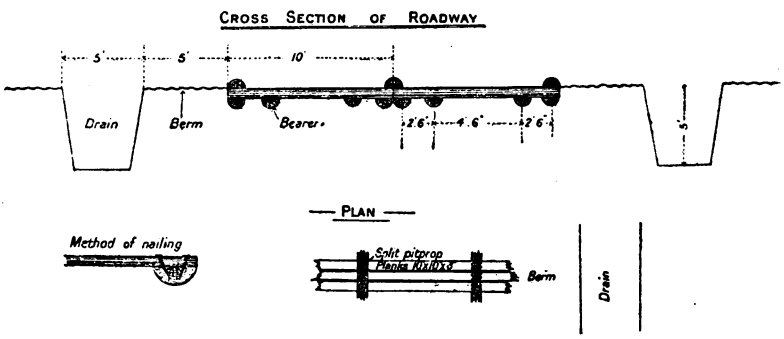
METHOD OF LAYING.

The planks are laid at right angles to the bearers, with no camber. The ends of planks in the centre of the road should be flush, and a split pit prop should be securely nailed down the centre of the road to keep traffic on its proper side. It is also advisable to do the same on the outside edges of the planking. It checks side slipping in wet weather. All nailing should be on the skew. Wire nails are better than spikes, as the latter split the planking.

The planks should be laid flush, otherwise the road will be kicked up by horse traffic.

The advantages of this method of road building are many. It is strong and durable—it is quickly constructed, and easily repaired—and, what is very important, is the fact that the materials are always available from the Forest Control Officer.

A plan and cross-section, showing details of construction, are added. The writer's company constructed 250 yards of this double roadway, including side-drains and guard rails, in three days, working daily from 4 a.m. until 2 p.m., often under heavy shell fire; and the road was used by every kind of wheeled transport, including heavy howitzers, drawn by tractors. It stood the severe test satisfactorily.



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WEIGHTS AND MEASURES.

By A.B.

WITH reference to the article "Weights and Measures," which appeared in the February number of the *R.E. Journal*, giving the actually scaled weights of Field Company vehicles on service, it would have been of greater interest if the weights had been given side by side with the authorized weights of vehicles taken from *F.S.M.*, 1915, for Field Companies, R.E.

The weights show such a wide divergence from the loads designed for the teams that it seems desirable to publish such table and to enquire what alterations in loads have been found necessary.

Vehicle.	Actual Weights Scaled.		*F.S.M.* Designed.
	Max. lbs.	Min. lbs.	Weight lbs.
Double Tool Cart	5,280	5,588	4,085· 2¾ oz.
Wagon, Limbered, R.E. ...	3,163	3,384	2,027·10 ,,
Wagon, G.S.	7,066	—	3,942·12¾ ,,
Pontoon Wagons	8,135	8,267	5,550· 9½ ,,
Trestle Wagon	8,565	—	6,032·14¼ ,,
Water Cart	2,832	—	2,521· 6 ,,

From the above it seems that the actual weight to be drawn by a single horse varied in fact between 1,320 and 1,760 lbs., the designed weight being uniformly 1,000 lbs. or a little less.

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REVIEWS.

NOTES ON MILITARY EXPLOSIVES.

By MAJOR-GENERAL ERASMUS M. WEAVER, U.S. Army; Chief of Coast Artillery.—(Messrs. Chapman and Hall, Ltd., London, 13s. 6d. net).

This book, which has a wide scope, goes into the subject very thoroughly, and in considerable detail. The best idea of its nature will, perhaps, be given by considering each of the ten parts and the three appendices, into which it is divided, individually.

Part I.—Principles of Chemistry.

To describe this part it is only necessary to quote the author:—"Before entering upon a study of explosives it is desirable that some knowledge be had of the fundamental chemical principles involved in the composition of explosive substances and in the changes which take place in connection with explosive phenomena. To this end a brief review will be given of the simple chemical laws, the system of notation, the meaning of chemical reactions, the relations of volumes and weights in those reactions, and problems arising thereunder."

Part II.—Substances used in the manufacture of explosives.

The various substances used in the manufacture of explosives are considered, their chemical structure, manufacture, and characteristics being given. In the case of Trinitrotoluol the chemical specifications and tests for Military Trinitrotoluol are added.

Part III.—General Remarks on Explosives.

In this part explosives are divided into three classes:—

1. Progressive or propelling explosives. (Low explosives).
2. Detonating or disruptive explosives. (High explosives).
3. Detonators or exploders. (Fulminates).

It will be seen that explosions are divided into three kinds; explosions proper, detonations, and fulminations. The nature of each kind is considered and described.

Part IV.—Progressive explosives.

Progressive explosives are divided into two classes:—

1. Charcoal powders.
2. Nitrocellulose powders.

The composition and manufacture of the principal powders of each class are described. Nitrocellulose powders are divided into two further classes, Pure Colloids, and Composite Colloids—the latter including our own cordite.

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Part V.—Detonating Explosives.

These are divided into :—

(*a*). Guncotton.
(*b*). Nitroglycerine.
(*c*). Dynamites.
(*d*). Explosive Gelatin.
(*e*). Picric Acid Derivatives.

Descriptions of the composition and properties are given, and the part closes with a list of the requirements enumerated by the Ordnance Board, U.S. Army, for high explosives for shell.

Part VI.—Exploders.

As fulminate of mercury forms the active ingredient of most exploders, the greater portion of this part is devoted to a description of the manufacture and properties of that substance, together with an account of the method of loading it into caps, and a short description of such caps or primers.

Part VII.—Service tests of explosives.

The manufacture, inspection, and tests of raw materials as well as explosives are given, and also specifications of the standard required to be attained.

Part VIII.—Storage of Explosives.

This part consists of notes on the construction, siting, ventilation, etc., of magazines. Lists are given of those explosives which may be stored together, and those which must be kept in separate compartments. Special Storage Regulations for High Explosives are given; and the part concludes with a table of the minimum distances that should separate storage magazines from inhabited buildings, according to the weight of explosive stored. It must be remembered that the regulations given throughout the book are those in force in the United States of America, and so, probably, are not entirely in accordance with English practice.

Part IX.—Handling High Explosives.

As each explosive in the book has been considered the precautions to be kept in mind have been pointed out. Part IX. commences by collecting and summarizing the more important precautions of a general nature to be observed in handling explosives. Safety precautions in preparing to fire demolition charges, and details of preparing a charge for firing are next given, followed by a description of the Laflin and Rand Magneto-electric Exploder, the U.S. Army Service Exploder.

Part X.—Demolitions.

In this section the calculation of charges and the use of explosives in demolition is described for buildings, bridges (masonry and iron), iron plates, masonry tunnels, stockades or barriers, and railroads, and also for subaqueous demolitions. Calculations for land mines are also given. The part concludes with tables of the relative strengths of various explosives, and a summary of charges for hasty demolitions.

Appendix I.—Laboratory Experiments and Notes.

This appendix gives a number of experiments and laboratory notes to illustrate the chemical principles set forth in Part I.

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Appendix II.—Regulations for the Transportation of Explosives by Freight and Express.

Appendix III.—The *Rôle* of Chemistry in the War.

Appendix III. is by no means the least interesting part of the book. It is intended for the layman as well as for the student of explosives, and is reprinted from the *Journal of the Franklin Institute*, of February, 1916. In it the author shows the *rôles* of Nitrogen, Carbon, Hydrogen, and the Halogens.

If the average man were asked what part chemistry played in the War, his reply would probably be concerned with gases, the Halogens. How far his answer would be short of the truth may be shown by quoting a few remarks of the author on the subject of Nitrogen alone.

"Educated people are, of course, aware that fixed nitrogen in combination with carbon, hydrogen, and some few other minor elements is built up by vegetable life and, in turn, assimilated into the bodies of animals, thus supplying our food of almost every variety. . . . One thing that is not very generally apprehended by educated people, however, is that without fixed nitrogen in great abundance mankind could not wage war upon one another under modern conditions. Ever since gunpowder replaced the bow and arrow fixed nitrogen has been used by man to hurl destructive missiles at his adversaries. In fact, it should be stated that no explosive substance has ever been used in peace or in war which did not depend for its activity on the extraordinary properties of the element nitrogen, which, as the major constituent of the air we breathe, could almost be said to content itself with the inert and pacific *rôle* of toning down the activities of its restless neighbour, oxygen. . . . Fixed nitrogen is the first and most important element of national defence. . . . The fact that fixed nitrogen will become an increasingly important factor in the production of food simply means that, come peace or war, foresighted preparation will not under any circumstances be unprofitable or in vain."

J.D.B.

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PAGES D'HISTOIRE, 1914—1917.

Published by the Librairie Militaire Berger-Levrault, 5—7, Rue des Beaux-Arts, Paris.

(*Continued from R.E. Journal for April*).

The 144th number of the above series contains the official communiqués issued by the Central Government to the French Provincial Authorities during the month of July, 1917; it is the XXXII. volume dealing with this subject. It is provided with a number of appendices; therein will be found the text of the speech made by Monsieur Antonin Dubost, President of the Senate, on the 12th July, 1917, at the distribution of prizes at the Lycée Saint Louis (formerly the Harcourt College); the text of the messages exchanged by the President of the French Republic with Crowned Heads and the Presidents of other Republics on the occasion of the anniversary of the founding of the French Republic; the text of speech made by Monsieur Albert Dalimier, Under Secretary of State for the Department of Beaux-Arts, on the 13th July, 1917, at the distribution of prizes at the *Conservatoire National de Musique;* the text of the speech made by Monsieur Paul Deschanel, President of the Chamber of Deputies, on the 28th July, 1917, in connection with the Franco-Roumanian Demonstration at the Sorbonne.

Monsieur Dubost in his speech reminded his audience that it is at all times a trying experience to address words to the youth of a nation, words which shall contain the germs of instruction. He found it still more so to speak to the young men of 1917!

The gates of the Lycée which were about to shut behind them had not opened, as was formerly the case, to admit them on to the pleasant paths leading to a joyous future, but it had done so to allow them to enter the blood-stained fields on which was being played the greatest drama of history. They would have at once to undertake the noblest of duties, to be subject to a new and strict discipline. They would, in a few months' time, be students in a new and terrible School, learning the most difficult of lessons. They would find former comrades describing the parabola no longer on the blackboard, but at the gaping mouth of the cannon. The young men of 1917 had a double duty to perform: to bring the present War to a victorious conclusion; to reconstruct a new France.

The hereditary enemy of France, who realized to the full that the destiny of nations was at stake, had concentrated all his hopes on one last stratagem. He relied no longer on the criminal chemistry of his gases, nor on the perfidious cunning of his U boats, but on the pernicious poison of shiftless pacifism, on the whimsical philosophies that his agents were offering as a refuge to the war-weary, to those overcome by their deep sorrow, to the vain and ignorant demagogue. He was endeavouring

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to infatuate the young and inexperienced democracy of Russia with fatal doses of this virus. No doubt he will make an effort to drug France too. But the young men of France will see in this extra-military offensive but an indirect admission by Germany of her defeat, and this will be another reason to them for holding on during this last and decisive quarter of an hour. They will put on their helmets of good sense and patriotism and thus pass in safety through the poisoned clouds being discharged by German agents.

Monsieur Paul Deschanel in his speech stated that they had met together in order to give expression to their fraternal affection for Roumania. Through space, through time, Roumania and France, who are of the same race, have had the same ideals. He pointed out that Roumania had had many difficulties in her way, but she had overcome them in order to take her place as a belligerent in the Great Conflict being waged on behalf of civilization. She had entered on the War on behalf of the same ideals of right which had led the United States of America to support the cause of the Entente Powers.

The 145th volume is entitled *Le Livre Blanc Grec ;* and contains the diplomatic correspondence, in two parts, relating (1) to the Greco-Serbian Treaty of Alliance and (2) to the Germano-Bulgarian Invasion of Macedonia. It is the XIII. volume of the series dealing with diplomatic *Pourparlers* and contains the text of 77 documents, of which the first 44 relate to the Greco-Serbian Treaty of Alliance. The majority of the documents bear a double date, *i.e.*, Old as well as New Style ; throughout this notice all dates will refer to the Gregorian Calendar, unless otherwise indicated.

The documents to which this volume relates were laid before the Greek Parliament at its sitting of 17th August, 1917 ; they afford a glimpse of the influences which were at work and betrayed Greece into a course of conduct that ended in her ceding a part of her soil, a part of her army and a great part of her Sovereignty into the hands of the King of Prussia.

From the first document in the volume we learn that M. Lambros A. Coromilas, the Greek Foreign Minister, and M. Mathias Boschkovitch, Serbian Ambassador at Athens, being duly authorized by their respective governments, drew up on the 5th May, 1913, the Heads of Agreement to be embodied in a Treaty of Alliance between Greece and Serbia as follows :—

1. The Governments of Greece and Serbia undertake to enter into and to sign a Treaty providing for a defensive alliance between the two countries within 20 days of the date last mentioned.

2. A stipulation must be contained in the Treaty that the two Governments will act in mutual support of one another, so that Greece and Serbia may acquire a common frontier to the W. of the river Axios (Vardar) and that the delimitation of the new frontiers must proceed on the basis of effective occupation.

The general line of the frontier to be as follows :—

Starting from the Kamena Planina Chain (Kamna), which delimits the high Schkoumbi, S.W. of Lake Ochrida, the line will follow the S. bank of the lake, will strike the W. bank of Lake Prespa at the village

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of Kousko, and cutting across the latter lake will be drawn to Dolni Dupliani on the E. bank; thence, it will pass to the E. of Rahmanli, follow the water parting between the rivers Erigon (Tscherna) and Moglénica, striking the river Axios (Vardar) about 3 kilometres S. of Ghévghéli.

The Greco-Bulgarian and Serbo-Bulgarian frontiers must be settled on the principle of effective occupation and to secure a balance of power between the three States in question.

The Serbian frontier N. of Ghévghéli will follow the course of the river Axios (Vardar) to its confluence with the Brégalnitza, continuing to a point near the former Turco-Bulgarian frontier.

The Greco-Bulgarian frontier will pass to the S. of Kilkitch, to the N. of Nigrita, by Orliako and thence by Lake Achinos (Tachinos) and the river Angitis (Anghista) to the sea at a point E. of Port Eleuthérai.

Fuller details of this frontier line will be set out in the Treaty.

3. The Governments of Greece and Serbia bind themselves to act in harmony and mutually to support one another in the negotiations about to take place in connection with the partition of the territories to be ceded by Turkey; they will reciprocally lay claim to the frontier lines between Greece and Serbia, Greece and Bulgaria, Serbia and Bulgaria indicated in the preceding paragraph.

4. In the event of a dispute arising with Bulgaria on the subject of the frontiers outlined in para. 2 and on its being found impossible to come to an amicable understanding, the Greek and Serbian Governments shall be at liberty jointly to propose to Bulgaria that the difference between them shall be submitted to mediation or to arbitration. Should Bulgaria refuse to accept the procedure of a pacific settlement and assume a threatening attitude or attempt to impose her claims by force, the two Governments bind themselves, in order to secure the integrity of their territories, to lend each other military assistance and only jointly to conclude peace on terms to be mutually agreed.

5. A military convention will be entered into without delay with the object of preparing and assuring the necessary measures for defence *to meet the case of an attack on the two States, without provocation given, by a third Party.*

The Treaty of Alliance, which was strictly secret, embodying the above Heads of Agreement contains 11 articles and was duly signed on the 1st June, 1913, by M. Jean Alexandropoulos, Greek Ambassador at Belgrade, and M. Mathias Boschkovitch, Serbian Ambassador at Athens; the documents ratifying this Treaty were duly exchanged by the two Governments at Athens on the 21st June, 1913. Serbia secured thereby full use of the Port of Salonika for 50 years and certain other commercial advantages.

A military convention was drawn up on the 14th May, 1913, and signed *ad referendum* by Capt. Jean Metaxas, General Staff, on behalf of Greece, and by Colonel Petar Pechitch, General Staff, and Colonel Douchan Toufegdjitch, on behalf of Serbia. This convention was not ratified, so another one was drawn up on the 1st June, 1913, by Capt. Xenophon Stratigos, General Staff, on behalf of Greece, and Colonels Pechitch and Toufegdjitch, on behalf of Serbia; documents ratifying

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the latter convention were exchanged at Athens on the 21st June, 1913.

There are 13 articles in the military convention which was ratified, as follows:—

1. *In case of war between one of the two Allied States and a third party* under the circumstances contemplated in the Treaty of Alliance between Greece and Serbia, or in the case of a sudden attack by large bodies of Bulgarian troops—at least two divisions—on the Greek or the Serbian Army, the two States, Greece and Serbia, promise to afford each other military support, Greece with the whole of her land and sea forces and Serbia with the whole of her land forces.

2. At the outbreak of hostilities and by the time that operations begin Greece must have an army of 90,000 combatants concentrated in the region between Mont Pangaion, Salonika, and Gouménitsa, and Serbia an army of 150,000 combatants concentrated in the region Ghévghéli, Veless (Kioprulu), Koumanovo, Pirot. In addition Greece is obliged, at the same time, to have a fleet ready for action in the Ægean Sea.

3. The two States must bring the remainder of their military forces into the zone of operations as soon as they are mobilized and ready.

4. A diminution of the forces mentioned in Article 2, either by reason of a partial demobilization or by the despatch of troops elsewhere, is not permissible, except by agreement between the General Staffs of the two Allied Countries duly entered into in writing.

But should Greece, under the circumstances contemplated in Article 1, find that she is compelled at the same time to defend herself against some Power other than Bulgaria, she must bring to the aid of Serbia, *if attacked by Bulgaria*, a number of troops to be fixed upon by agreement between the General Staffs of the two countries at the time such necessity occurs; the number of troops being decided according to the requirements of the situation and so that the safety of Greece may not be jeopardized.

Reciprocally, should Serbia find herself in a position necessitating provision for defence against a Power other than Bulgaria, she must bring to the aid of Greece, *if attacked by Bulgaria*, a number of troops to be fixed upon, by agreement between the General Staffs of the two countries at the time such necessity occurs, the number of troops being decided upon according to the requirements of the situation and so that the safety of Serbia is not jeopardized.

5. Should either of the *two contracting parties declare war against Bulgaria or some other Power* without previous agreement and without the concurrence of the other contracting party, the latter will be released from the obligations imposed under Articles 1 and 2 of the Convention. Nevertheless, the latter party must observe a benevolent neutrality towards its ally during the whole duration of the War and will be obliged immediately to mobilize, Greece at least 40,000 combatants and Serbia at least 50,000 combatants, on its own territory, in such manner as to protect its own neutrality and, in consequence, so as to secure the freedom of movement of the Allied Army.

6. Military operations against Bulgaria will be planned jointly in agreement. The plan of operations will be worked out by the General

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Staffs of the two States or by their delegates. This plan may, in order to meet a change in the military situation, be modified, by agreement in writing, by the two General Staffs.

7. After the commencement of hostilities, whatever may be the progress of events in connection with military operations, whatever may be the localities through which the troops of one or the other Allied States may pass during the course of military operations, and whatever may be the towns, villages or localities that shall be occupied for military reasons by these troops, the definitive occupation of the territory beyond the frontier line between Greece and Serbia on the one hand and Bulgaria on the other, provisions relating to which are contained in the Treaty of Alliance between Greece and Serbia, and whereof the present Convention is the complement, will be dealt with on the following lines :—

Greece shall have the right definitively to occupy and annex the region situated to south and east of the line which, starting at a point on the Vardar immediately N. of Sehovo, passes between the villages of Bogoroditsa and Mazucovo, thence continues by the crest between the villages of Selimli and Dautli, Heights 535,227, across the lake, through Heights 397, 1494, along the ridge of Mont Bélès, through Peak 1800 metres to N.W. of Karakioi, to Height 2194 (Pérelik).

Serbia shall have the right definitively to occupy and annex the region situated to the N. and N.W. of the above-mentioned line.

Greece agrees to the occupation by Serbia of a territorial zone, having a width of 6 kilometres, situated on the left bank of the Nestos-Mesta (Karassou), to the N. of Xanthi and to the E. of Buru-Golũ. Serbia on the other hand undertakes to allow Greece free passage across this zone and acknowledges that the territory E. of this zone lies wholly within the sphere of influence belonging to Greece and that she herself has no claim whatever thereto.

Should it become necessary in the course of military operations for one of the two armies to occupy any territory, towns or villages situated in the zone of the other army, such territory, etc., will be immediately evacuated, on demand being made to this effect by the State entitled thereto, under the provisions of the preceding article hereof.

8. The definite objective of the military operations which may be undertaken by the Allied Greek and Serbian Armies being the destruction of the military forces of Bulgaria, in the event of one of the two armies being unable to attain this result in its own theatre of operations, it must accept the assistance of the other in the same theatre. Nevertheless, the Army which has accomplished its purpose in its own theatre of operations must lend aid to the other whether its assistance may be called for or not, in order that by the combined action of the two Allied Armies Bulgaria may be forced to accede to the demands made on her by the two Allied States and to agree to peace terms.

9. Neither of the two Allied Armies shall conclude an armistice of a duration longer than 24 hours nor tacitly suspend hostilities.

An armistice exceeding 24 hours in duration shall only be agreed to after an understanding arrived at in writing between the two Allied States ; the conditions under which the armistice is to be agreed to will be eventually laid down by these Allied States at the same time.

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10. Each of the Allied Armies will reciprocally enjoy, on the territory of the other contracting party, all the rights and privileges conferred on the troops of the latter (nationals) by the laws and ordinances in force, except as regards rights relating to requisitioning. The civil and military authorities of the two contracting parties must co-operate to secure the end in view.

Payments for purchases made to meet the needs of the army of one of the Allied States in the territory of the other must be regularly made in cash at the ruling market rates. Under exceptional circumstances payments may, on the demand of the competent authorities of the other Ally, be made by the scrip placed at the disposal of the Allied Army.

The rate of exchange between the Greek and Serbian currency shall be fixed by agreement between the two Allied Governments. It is to be understood that in territory taken from the enemy and occupied by the Allied Armies, both contracting parties are to enjoy, in matters relating to supply, etc., all privileges arising out of the ordinary customs and usages of War.

Each of the two Allied Armies are to enjoy these privileges only on the territory which belongs to its own zone of occupation, as indicated in Article 6 of the present Convention. The cost of transport of troops, stores, booty, etc., by railways and boats, will be borne by that contracting State in whose territory the movement takes place.

11. Booty shall belong to that Allied Army which effects the capture thereof. Where booty is captured on the same battlefield by a combined Allied force, it shall be divided proportionally in the ratio of the number of combatants of the two armies participating in the capture.

12. The present Convention is to remain in force concurrently with and during the same period as the Treaty of Alliance between Greece and Serbia.

Article 2 of the present Convention may be modified by agreement in writing between the General Staffs of the two States, after the present crisis is over and demobilization ordered.

13. The present Convention will come into force on the date on which it is ratified.

The text of the Military Convention drawn up on the 14th May, 1913, is printed side by side with the later one. The earlier convention contained only 10 articles; the main points of difference will be referred to later.

Documents relating to the negotiations between Greece and Serbia follow the texts of the Treaty and Convention already referred to above. On the 23rd May, 1913, the Greek Foreign Minister telegraphed to the Greek Ambassador at Belgrade; after acknowledging receipt of the former's despatch relating to the Note which the Serbian Government were about to address to the Bulgarian Government, he states that, in spite of the Bulgarian attack at Pangaion, Greece did not wish to take the offensive and march against Serres, but that the then situation could not be allowed to continue, as it was an extremely dangerous one, and Greece would have to act forthwith. The treaty between Greece

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and Serbia, it was provided, should be signed at latest by the 25th May, 1913; therefore, the Greek Ambassador at Belgrade was given authority to sign this Treaty forthwith and at the same time received instructions regarding slight modifications to be inserted in the text of the document in question. The modifications referred to were duly incorporated into the Treaty which was signed on the 1st June, 1913.

In a telegram dated 23rd May, 1913, from the Greek Minister at Belgrade to the Greek Foreign Minister, the former forwarded the views of Capt. Stratigos on the modifications which the Serbians wished to introduce in the Military Convention drawn up on the 14th May. Article 1 of the earlier Convention provided for mutual co-operation between Greece and Serbia only in the case of a war between Greece and Bulgaria or between Serbia and Bulgaria. Serbia desired to enlarge the operation of this article so as to include a war between the Allies and any third party. Capt. Stratigos pointed out that the proposed alteration would not be an improvement from the Greek military point of view. "The strictly defensive character of the Alliance," he said, "is to the advantage of the Serbians, who are asking nothing more from the Bulgarians than that of which they are in possession to-day, when however we raise our claim to the territory S. of the line Kilkitch-Orliako, referred to in the Heads of Agreement, a territory now occupied entirely by the Bulgarians, any advance on our part with the object of taking over this region may be interpreted by the Serbians as a provocative act. Moreover, this strictly defensive character is calculated to allow Bulgaria all initiative and liberty of action, which from a military point of view is very disadvantageous. The enlargement in the scope of the Alliance from one against Bulgaria only, so as to include any third party whatever, is prejudicial to our interests from the military point of view and only to the advantage of Serbia. Indeed, the latter only possesses land frontiers and has more neighbours than we have, with any one of whom it may at any moment enter into a conflict, in which case we would be obliged to go to its assistance; on the other hand, Bulgaria is the only Power against whom we can have a land war; it is in this event alone that Serbia can be useful to us. As far as our eventual differences with any other Powers are concerned, Powers who may attack us at sea, the assistance of Serbia would be no value." He further points out that it would be more advantageous to Greece to modify the provisions of the Treaty of Alliance to make it agree with the Military Convention rather than *vice versâ*.

The Serbians also asked for a modification of the latter part of Article 6 of the Military Convention of the 14th May, 1913, which provided as follows:—"The Greek Army shall have the right to occupy the territory situated to the south and south-east of the line Gradec, along the ridge of Mont Bélès—through Peak 1800 metres N.W. of Karakioï, to Height 2194 Pérelik; the Serbian Army, the territory to the north and north-west of the aforesaid line. The line suggested by the Serbians was one which "starting on the Vardar 3 kilometres S. of Ghévehéli, passes between the villages of Bogoroditsa and Mazukovo, to the N. of the village of Selimli, to the S. of Dautli, thence through Heights 535 and 420, by Hissar-Tépé, Heights 127, 217, 490, 576, along the crest of Kroussa

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Balkans to Height 645 (on) Butkova Lake to the river Strouma, then through Peak 1800 to N. of Karakioï, and Heights 2194, 4038, 8994 and 8475. The Serbian Army shall have the right to occupy the territory north of the above-mentioned line." The line finally agreed upon is defined in Article 7 of the Military Convention of the 1st June, 1913. With regard to the proposed line set out above Capt. Stratigos states that the Serbians give as a reason for claiming the above frontier line that, in case of a successful war against Bulgaria, Greece would be sufficiently indemnified by an extension of her frontier on the East. He continues: "Such a proposition, which may be open to discussion under other circumstances must be rejected to-day, not so much because we would be deprived of a great stretch of rich lands but rather on military grounds. Since by accepting the line proposed by Serbia, we should find ourselves, even after a successful war against Bulgaria, deprived of a natural and strong frontier to the N. of Salonika, such as Mont Bélès provides. Should Mont Bélès and, towards the E., the defile of Démir-Hissar, be in the hands of another State, such State would possess the advantage of being able to concentrate its army against us in the Struma valley and to advance, without meeting any obstacles, into the plains of Serrès and on Salonika. The occupation of Milovitsa and of the defile by us would, on the other hand, compel him to concentrate more to the north and would materially retard his advance; the occupation of these places would be of incalculable advantage to us and would facilitate our subsequent operations in this region. Another very great disadvantage, which we would experience in the event of the proposed line being adopted, is that the use of a great part of the Salonika-Serrès railway from Kilindir to the Hani-Derven over the Struma would be lost to us. The construction of a new railway from Salonika to Serrès continued across the proposed frontier presents great difficulties owing to the configuration of the ground."

On the 26th May, 1913, the Greek Ambassador at Belgrade sent a further telegram to the Greek Foreign Minister containing the modifications demanded by the Serbians in the Military Convention of the 14th May, 1913—as submitted by Capt. Stratigos.

Capt. Stratigos pointed out that:—(1), The Serbians insisted on the enlargement of the scope of Article 1 of the Convention on the ground that, *in the event of a conflict with Bulgaria alone, Serbia would not require an alliance with Greece;* (2), the Serbians now demanded that the Greek contingent referred to in Article 2 of the Convention should, in the first instance, consist of 100,000 combatants (in the original Convention a Greek contingent of 90,000 combatants was provided for); (3), the Serbians wished to add a second paragraph to Article 4 to provide for the contingency of one of the Allies declaring war against Bulgaria without previous agreement with the other.

Capt. Stratigos also stated that a new article was being added dealing with matters relating to supplies, method of payment for expenditure incurred, exploitation of the resources of occupied territory. He was generally favourable to the acceptance of the modifications proposed; the question of the enlargement of the scope of the Convention to provide against a conflict with any third Power being one affecting the

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whole policy of Greece, he asked that further instructions might be given him on the subject.

On the 27th May, 1913, the Greek Foreign Minister telegraphed to the Greek Ambassador at Belgrade in reply to the communications relating to the Military Convention. The Serbian modifications to Articles 1 and 4 were accepted, but the Greek Government held out against the increase of the contingent required in Article 2. Capt. Stratigos had succeeded in obtaining a modification in the frontier line proposed by Serbia and instructions were issued that this line should be fully and clearly defined. It was pointed out that the Serbian demand for a stretch of territory, having a maximum width of 10 kilometres along the Nestos for the construction of a railway to a port on the Ægean Sea to be acquired by them would be of very considerable value to them and therefore, as a *quid pro quo*, it was suggested that Serbia should cede half of Doiran Lake to Greece.

On the date last mentioned, the Greek Foreign Minister addressed a telegram to King Constantine, then at Salonika, informing him that Serbia was desirous of acquiring a seaport on the Ægean Sea and suggested that the proposal be accepted subject to Greece having free right of access thereto and running powers over any Serbian railway constructed thereto. It was suggested that the strip of territory to be acquired by Serbia for this purpose should lie between Xanthi, Yenidjé and Gioumouldjina; these towns to remain outside the Serbian zone.

The continued attacks of the Bulgarians made the situation serious and on the 30th May, 1913, the Greek Foreign Minister telegraphed to the Greek Ambassador at Belgrade that should Serbia still insist on having a stretch of territory in order to have access to the Ægean Sea, the latter was authorized to enter into an agreement as follows:— "A band of territory, up to 10 kilometres wide, starting from a point to be fixed on the line Karakioï-Pérelik to the Ægean Sea, passing between Xanthi and Gioumouldjina, is conceded to Serbia, Greece being assured free passage across the same as well as all other facilities."

The next telegram in the volume bears date 24th July, 1914 (*i.e.*, nearly 10 months later than the previous one); it is addressed by the Greek Foreign Minister at Athens to M. Venizelos, the then Greek Premier, who was at the time at Trieste. It contains the information that the German *Chargé d'affaires* had called at the Foreign Office at Athens and had read, in the strictest confidence, the text of a despatch which his Government had addressed him on the European situation. In this despatch it was stated that the possibility of an armed conflict between Austria and Serbia could not be excluded from the German purview, and in these circumstances the Wilhelmstrasse intended to stand by the Ballplatz. It was probable that Bulgaria might take advantage of the opportunity, which was thus afforded her, to secure the ends she was seeking. It was not known what attitude Turkey would take up. It was desirable that Greece should hold herself aloof from Serbia. Under the existing circumstances, it was suggested, an Alliance with Turkey was impracticable, but it was thought probable that an understanding might be arrived at by Greece on the subject of mutual neutrality. The Greek Foreign Minister goes on to say that,

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whilst assuring the German *Chargé d'affaires* that Greece would do its best to secure the continuance of peace, he explained the difficulty of her position in the event of Bulgaria participating in an attack on Serbia. He had reserved his reply to the suggestions made to him until he could consult the Premier and the King of Greece.

On the day following (the 25th July) the Greek Ambassador at Belgrade telegraphed to M. Venizelos, then at Munich, saying that the Serbian Premier had asked him to ascertain: "Whether the Serbian Government may rely on military assistance from Greece: (1) in the event of Serbia being attacked by Austria and (2) in the event of Serbia being attacked by Bulgaria." It was further notified that the Serbian Ambassador at Athens was raising the same questions. It was also intimated that the Serbian Premier had stated that Montenegro would stand by Serbia in the event of an attack on her either by Austria or by Bulgaria, and that Roumania was interesting herself with a view to preventing a war between Austria and Serbia and would decide upon her subsequent conduct later should hostilities break out. Latest information from St. Petersburg indicated that Russia would support Serbia by force of arms, but the decision of the Czar was awaited on this point.

On the 25th July, the Greek Ambassador at Berlin telegraphed to the Greek Foreign Minister at Athens and informed him that he had had a long interview with Von Jagow (the German Foreign Minister) who had informed him that the relations between Austria and Serbia had reached a critical stage and that the German *Chargé d'affaires* had been instructed to apprise the Greek Foreign Office at Athens of the views of the Imperial Government. The Greek Minister stated that he had informed Von Jagow that, should Bulgaria think fit to intervene in the quarrel, Greece would immediately also come into the conflict. Von Jagow thereupon particularly emphasized the dangers of an intervention on the part of Greece for the purpose of restraining Bulgaria. These dangers were, according to him, the possibility of Turkey coming in against Greece, owing to Serbia being occupied with defending herself against Austria, and the further possibility, which had to be reckoned with, of Roumania standing out whilst Serbia was being attacked by Bulgaria. Von Jagow stated that Roumania had coquetted with the Triplice and was not therefore likely to come in against Austria. The Greek Ambassador had pointed out to Von Jagow that Greece could not countenance any action on Bulgaria's part tending to upset the balance of power in the Balkans secured by the Treaty of Bukharest. Since, should Bulgaria be allowed to aggrandize herself, she would become so powerful that in a few years' time she would launch an attack against Greece. Von Jagow was further informed that if he really desired that the Balkan Powers should not intervene in the quarrel, he ought to address himself to Sofia with the object of compelling Bulgaria to remain quiet.

Owing to the reticence of Von Jagow, on the subject of the probable conduct of Bulgaria, it was conjectured that Austria and Bulgaria had decided upon common action. Von Jagow, at the same time, expressed the opinion that the military party in Turkey showed a very friendly disposition towards Greece and that this circumstance should not be lost sight of.

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M. Venizelos telegraphing, on the 25th July, from Munich to the Greek Foreign Minister at Athens stated: "As regards our attitude, in the event of hostilities between Austria and Serbia, whilst reserving our opinion as regards the action to be taken under the Treaty of Alliance, it is necessary to leave no doubt in the minds of your questioners as to our intention of not remaining inactive with our arms crossed in the event of a Bulgarian attack on Serbia. *It would be impossible for us to tolerate such an attack, which would result in an aggrandisement of Bulgaria, and which would at the same time nullify the Treaty of Bukharest. The question is not merely one concerning our duty to our ally Serbia, but as an imperative necessity we must act for our own preservation.*"

Replying on the 26th July, from Munich, to the Greek Ambassador at Belgrade, M. Venizelos stated that he must consult with the King and Government of Greece before giving definite answers to the questions of the Serbian Premier. He asked that his personal views should be communicated strictly confidentially to the latter as follows:—(1), As to the eventuality of a war between Austria and Serbia, M. Venizelos hoped that such a war, which would be a veritable calamity for everyone, might be avoided, thanks to the conciliatory attitude of Russia and Serbia; but should war unhappily break out, Greece would weigh all the circumstances of the moment and take such action as might be likely to prove effective; (2), as regards the eventuality of an attack on Serbia by Bulgaria, M. Venizelos would advise the King and Government of Greece to oppose Bulgaria with the whole strength of Greece, in order to safeguard Serbia from the Bulgarian danger and to give effect to the provisions of the Treaty of Bukharest.

The Greek Foreign Minister replied to the Greek Ambassador at Berlin on the 28th July, stating that he had informed the German *Chargé d'affaires* at Athens that Greece would be compelled to oppose Bulgaria by every means in her power should the latter participate in a war between Austria and Serbia; the most elementary principles of self-preservation and security rendered it impossible for her to tolerate an attack by Bulgaria on Serbia, since this would reopen the questions settled by the Treaty of Bukharest. The Greek Ambassador at Berlin was directed to make similar representations at the Wilhelmstrasse at the earliest opportunity.

When the rupture between Austria and Serbia took place M. Venizelos was still at Munich. In consequence, he sent a telegram, on the 29th July, to the Greek Foreign Minister containing general instructions for his guidance in the emergency that had arisen, pointing out that should it be possible for Greece to remain neutral in a war limited to Austria and Serbia, nevertheless Treaty obligations imposed the duty on Greece immediately to mobilize 40,000 men.

However the adoption of this course at that juncture was not likely to prove, in the judgment of M. Venizelos, advantageous to the common interests of Serbia and Greece, since the adoption of such measures would provoke a general mobilization on the part of Bulgaria, and probably precipitate events of a serious kind. The Greek Foreign Minister was requested to explain to the Serbian Government the reasons for the passive attitude being assumed by Greece and to reiterate

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the assurance that Greece was firmly resolved to mobilize without loss of time should Bulgaria call out her army. He was to add that the Greek attitude would correspond absolutely to that which the Serbian Government decided to adopt, in the common interest, at the time of the crisis between Greece and Turkey.

The Greek Premier was of opinion that the co-operation of Greece and Roumania might produce a beneficial effect at Sofia and it was suggested that the two Cabinets should present identical Notes without delay, containing an intimation to the Bulgarian Government that, should it mobilize its army, Greece and Roumania would immediately follow suit. M. Venizelos sent directions for the necessary steps to be taken in concert with Bukharest, to give effect to the foregoing suggestion.

The Greek Premier further stated that in the event of the War spreading to other Powers, Greece ought at all costs to avoid ranging herself against Serbia; as the adoption of such a course would be opposed to the vital interests of Greece, as well as being a breach of her Treaty obligations.

On the 2nd August, the Greek Foreign Minister sent a telegram to the Greek Ambassador at the Serbian Court, who was at the time at Nisch, informing him of the decision taken by Greece in relation to the attitude she proposed to adopt in connection with the Austro-Serbian Conflict. He was directed to acquaint the Serbian Premier that Greece held the independence and territorial integrity of Serbia to be the essential factor in the balance of power in the Balkans and that Greece was firmly resolved to uphold the provisions of the Treaty of Bukharest. The Greek Government felt that it would be fully carrying out its obligations by maintaining an attitude of benevolent neutrality towards Serbia, whilst, at the same time, remaining prepared to deal with Bulgaria should she attack Serbia. It was considered that a participation in the War by Greece would prove more harmful than useful to Serbia, as Greece could only furnish a comparatively small force to co-operate with the Serbian Army, and intervention on her part might result in decisive attempts being made by Austria against Salonika, the only port available for supplying Serbia. Moreover, the immediate entry of Greece into the War would seriously diminish the forces she would have available to put into the field against Bulgaria should the latter be drawn into the conflict later.

On the 4th August, the Greek Ambassador at Berlin telegraphed direct to King Constantine informing him that Kaiser Wilhelm had sent for him and had handed him a telegram which he had just received, through the German *Chargé d'affaires* at Athens, from His Majesty (*i.e.* King Constantine) and had desired him to communicate the following information:—

"The Kaiser desires Your Majesty to be apprised that an Alliance has this day been concluded between Germany and Turkey; Bulgaria and Roumania are also taking Germany's side; the German warships in the Mediterranean are joining up with the Turkish fleet so as to act combined. From this it will be seen that the whole of the Balkan States have ranged themselves on the side of Germany in the Conflict

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begun against Slavism. The Kaiser, in communicating the foregoing information to Your Majesty, urges you, by appealing to a Comrade, to a German Field Marshal of whom the German Army is proud, and to a brother-in-law, further reminding you that it was thanks to the support of His Imperial Majesty (the Kaiser) that Greece was allowed definitely to retain Kavalla, to give orders for the mobilization of Your Army and to take Your place by the Kaiser's side, in order to march, hand in hand with Him, against Slavism, the common enemy. The Kaiser added that He makes this last pressing appeal to Your Majesty, at this most critical moment in the history of the World, and He is convinced that Your Majesty will respond to this appeal. Should Greece refuse to range herself with Germany, then all relations between Greece and the German Empire will be broken off.

"*Finally, His Majesty informed me that what He asks you to do to-day is to put into execution those measures so often discussed between Your Majesty and Himself.*"

The Kaiser, at the time, also stated that He and the German people had never been very favourably disposed towards the Bulgars.

A second telegram sent on the same day by the Greek Ambassador at Berlin to King Constantine is included in the volume. Therein it is stated that the former, after his interview with the Kaiser, had had a long talk with Von Jagow, who had, under the seal of secrecy, confirmed the information relating to the Alliance formed between Turkey and Germany and had stated that though the Turkish troops would be under the command of the Sultan and Turkish Generals, yet General Liman would direct their operations. It was also intimated that an understanding existed between Turkey and Bulgaria and that these two countries would act against every other State which did not adopt their policy. Von Jagow expressed the opinion that the safety of Greece was to be secured by her marching with the other Balkan States against Russia and Serbia.

It is stated in this telegram that negotiations between Austria and Bulgaria had taken place at Vienna and that compensations would be sought in Serbia and in Albania in the event of Italy maintaining the reserved attitude she had taken up since the outbreak of hostilities, although it had not yet been decided what would be Bulgaria's share in the event of the success of the Central Powers.

The Greek Ambassador concluded his message to King Constantine by asking him to weigh carefully the consequences likely to follow upon a refusal on his part to yield to the Kaiser's appeal.

On the 7th August, the Greek Foreign Minister transmitted to the Greek Ambassador at Berlin King Constantine's reply to the first of the telegrams of the 4th *idem*, in which the King of the Hellenes stated: "The Kaiser is aware that My personal sympathies and My political opinions draw Me to His side. I shall never forget that it is to Him we owe Kavalla. After mature reflection, however, I find it difficult to see how I can be of any use to Him, should I immediately mobilize My Army. The Mediterranean is at the mercy of the combined British and French fleets. They would destroy Our Navy and Our Merchantmen, they would take our islands from us, and above all they would prevent the

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concentration of My Army, which can only be effected by sea, since railway facilities are not completed. Without being able to render Him assistance, we would be wiped off the map. I am compelled to acknowledge that neutrality is forced on us; this should be useful to Him, together with the assurance that His friends among My neighbours will not be touched, so long as they do not jeopardize Our interests in the Balkans."

In a telegram dated 7th August, the Greek Ambassador at Berlin informed the Greek Foreign Minister that the news from Constantinople communicated by the latter to the former was correct, but that sight was not to be lost of the fact that Turkey required at least a month for completing her mobilization. It was further stated by the former that Bulgaria had decided to attack Serbia, that Roumania would not intervene to prevent her doing so, whilst, at the same time, Turkey would not attack her (*i.e.* Bulgaria). Therefore in the event of Germany and Austria being victorious against Russia, Bulgaria was certain to be aggrandized at the expense of Serbia and Roumania, and at the expense of Russia. It was urged that the *only means by which Greece could secure her ends, would be by her joining Bulgaria in an attack on Serbia, which could never recover herself should Germany and Austria be victorious.* It was further pointed out that in view of Italy's attitude towards Germany and Austria, if Greece could arrive at an understanding with Vienna, Berlin would offer no objection to her (Greece) being compensated in Albania, the separate existence of which, once Serbia had disappeared as an independent State, would no longer be a matter of solicitude to Austria.

The foregoing telegram suggests that the Greek Ambassador at Berlin had become a convert to the German Code of Ethics on matters connected with treaties and international relations.

On the 9th August the Greek Ambassador at Berlin addressed a further telegram to King Constantine, in which he conveyed the information that Von Jagow had communicated to him that the Kaiser quite understood the attitude of neutrality taken up by the King of Greece for the present. The German Foreign Secretary had, however, urged that Greece should come to an understanding with Sofia and Constantinople as early as possible, adding that Serbia constituted the " bear's skin." Germany made yet another effort to detach Greece from her alliance with Serbia ; the tenour of a conversation on the subject between Zimmerman, the German Under Secretary for Foreign Affairs, and the Greek Ambassador at Berlin is contained in a telegram dated 11th August which appears in the volume under notice. Further, a telegram dated 12th August indicates that Germany had also brought strong pressure to bear at Athens ; she even threatened a rupture of diplomatic relations with Greece should she mobilize her army against Bulgaria.

The next communication in the series under notice is a telegraphic circular dated a month later—13th September—than the telegram last referred to. It is addressed by M. Venizelos, to the Greek Embassies and Legations at the Entente Courts and at Bukharest. Therein it is stated that the German Ambassador had, at an interview with the Greek Premier, informed him that Bulgaria and Turkey had arrived

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definitely at an agreement in relation to a participation in the War. Turkey was to lend Bulgaria two Army Corps for combined operations against Serbia, and she had agreed at the same time to maintain four Army Corps in Thrace as a threat against Roumania to prevent her from attacking Bulgaria. Neither Bulgaria nor Turkey had, it was stated, any intention of attacking Greece.

M. Venizelos had replied that it was impossible for Greece to stand by as a passive spectator, whilst Turkey and Bulgaria attacked Serbia; apart from the question of the protection of her own interests, she was under a definite obligation to go to the assistance of Serbia. He expressed the opinion that the foregoing communication was made to him by the German Ambassador in order to obtain a promise that Greece would remain neutral and to enable the German Government to use this promise as an inducement to Bulgaria and Turkey to undertake an attack on Serbia.

The diplomatic representatives addressed were requested by the Greek Premier to communicate, confidentially and without delay, the contents of the telegraphic circular in question to the Foreign Ministers of the States to which they were accredited and to telegraph the views of these Ministers thereon to him (*i.e.* to M. Venizelos).

On the 31st October, 1914, the Greek Ambassador at Berlin telegraphed to M. Venizelos, at that time holding office as Foreign Minister as well as Premier, informing him that he had had a long interview with Zimmermann who had announced himself satisfied with the fact that Russia had declared war against Turkey, and he hoped that France and Great Britain would be compelled to do the same, as in this War some part of the military forces of the two latter Powers, as well as Russian troops, would be diverted from their principal objective, Germany and Austria. Zimmermann was further expecting that Turkey would preach a Jehad in Asia, in India and in Africa; the unrest in the Islamic World, it was hoped, would cause embarrassment to France and particularly to Great Britain.

Zimmermann again assured the Greek Ambassador that Turkey would not attack Greece and that the interests of Germany were such as to require that Turkey should confine her attention to Russia, and he further advised that Greece should remain a passive spectator of the conflict.

Zimmermann further stated that he did not think that Bulgaria would come into the War against Serbia just then; should she do so later, the interests of Greece would be best served if she refused to intervene. On being informed that Treaty relations subsisted between Greece and Serbia, Zimmermann retorted, as might well have been expected, *that treaties had very little value*, and in support of this view instanced the treaties to which Germany and Austria and Italy, and the two former and Roumania were parties. The last words of the German Under Secretary of State at this interview were: "Try to render your ties with Serbia as loose as possible."

The document following the communication last referred to is dated 10th March, 1915, that is to say there is an interval of over four months between the two; it is the communiqué which the Gounaris Cabinet

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furnished to the Press on the day it came into power. In this document it is stated: "Greece, after her victorious wars, is in imperative need of a long period of peace in order to work for the prosperity of the country; for the organization of the public services, that of the land and sea forces, the development of public wealth, the provision of guarantees against all attacks, the security of those things which have been acquired by so many and great sacrifices. The pursuit of these, at the same time, permit of a programme serving the interests of the State being put into execution and allow the adoption of a policy conforming to the traditions of the Nation.

"At this juncture, neutrality has been forced on Greece since the beginning of the European crisis. But Greece has had and always continues to have the duty imposed upon her to fulfil her obligations as an ally, as also to act in pursuit of her own interests, but so as not to incur risks as regards the integrity of her territories.

"The Hellenic Government, being ready to do its duty to promote the interests of the Fatherland, is convinced that the patriotism of its people will provide the surest safeguard."

Three days later (13th March, 1915) the Greek Foreign Minister telegraphed to the Greek Ambassador at the Serbian Court, at that time still at Nisch, informing him that in view of the terms of the official communiqué published on the advent to power of the new Cabinet, he had instructed the Greek diplomatic representatives in London, Paris and St. Petersburg to give formal assurances to the respective Governments to which they were accredited that the New Cabinet would continue to pursue the policy inaugurated in Greece since the outbreak of the present Conflict. The recent crisis had been brought about, it was explained, by differences as to the immediate action to be taken by Greece, but did not affect the fundamental points of Hellenic policy.

Another long gap in the dates of the communications appearing in this volume occurs at this point in the history of Greek politics. We learn from a telegram, dated 30th July, 1915, addressed by the Greek Ambassador at Bukharest to M. Gounaris (Premier and Foreign Secretary), that the British Ambassador at Bukharest had made a communication to the former concerning a formal announcement made to Bulgaria by Germany to the effect that Greece had definitely decided to remain neutral in the event of an attack by Bulgaria on Serbia.

In consequence, on the 2nd August, 1915, M. Gounaris addressed a telegraphic circular to the Greek diplomatic representatives at Paris, London, Rome, Petrograd, Nisch, Berlin, Vienna and Sofia instructing them to reiterate the views of the Hellenic Government, so frequently made known, that in the event of an attack by Bulgaria on Serbia Greece could not remain passive and indifferent; it was explained that the Bulgaro-Turkish understanding only served to strengthen the bonds between Greece and Serbia.

Shortly after the foregoing instructions had been issued M. Venizelos once more found himself Premier and Foreign Minister and, on the 3rd September, 1915, telegraphed to the Greek Ambassador at Berlin notifying the concern of the Greek Government at the prospect of a combined attack by Austro-German forces on Serbia and at learning that

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more intimate relations were being formed between the Central Powers and Bulgaria. If these closer relations were to have no other effect than that of providing a free passage across Bulgaria for Germanic forces, the Hellenic Government would, it was stated, have no cause for alarm. But if, profiting by the arrival of Germanic forces, Bulgaria should attack Serbia, Greece could not quietly stand by and witness the probable annihilation of her Ally by Bulgaria. M. Venizelos again emphasized the point that Greece could not afford to see Bulgaria victorious in a struggle with Serbia, and even went so far as to suggest that the German Government could hardly have an interest in bringing about a wide-spread conflagration in the Balkans. Further, he expressed the hope that the German Government would hold Bulgaria in check and dissuade her from attacking Serbia.

M. Venizelos was succeeded by M. Zaïmis as Greek Premier and Foreign Secretary shortly after the date of the foregoing telegram. On the 8th October, 1915, M. Zaïmis in his turn sent a telegraphic circular to all Greek diplomatic representatives informing them that, although a change of Cabinet had taken place in Greece, the policy of that country remained unaltered. On the 12th *idem*, M. Zaïmis addressed a telegram to the Greek Ambassador in Serbia (then at Nisch), in which the latter was informed that the Serbian Ambassador at Athens had left a copy of a despatch from his Government at the Greek Foreign Office. In this despatch, the Serbian Government urged the view that the attack by Bulgar forces on Serbia, then imminent, constituted the *casus fœderis* contemplated in the Treaty of Alliance between Greece and Serbia; this Government, in consequence, wished to be informed whether the Greek Army would be ready to operate against Bulgaria and whether the Hellenic Government was prepared to issue instructions to its General Staff to get into touch with the Serbian General Staff for the purpose of working out a combined plan of operations. "The Greek Government is unable with deep regret," says M. Zaïmis, "to accede to the demand thus formulated by the Serbian Government. First of all, in the then state of things, it feels that the situation is not one within the *casus fœderis*." The Treaty of Alliance, it was argued by M. Zaïmis, was drawn up to meet the case of a conflict affecting mutual interests in the Balkans alone and cannot be invoked in support of a situation involving a general conflagration. In spite of the general terms of Article 1 of the Treaty of Alliance, the contracting parties, said M. Zaïmis, had in view the single hypothesis of an isolated attack by Bulgaria on one or other of them, as is borne out by the articles of the Military Convention which is a complement of the Treaty. Further, Serbia had broken off diplomatic relations with Bulgaria, because the Entente Powers, the former's European Allies, had done so, but she had not previously come to an agreement on the subject with Greece, her Balkan Ally. The situation was, in the opinion of M. Zaïmis, one outside the letter and the spirit of Treaty of Alliance.

The Greek Government, M. Zaïmis continued, is not only convinced that, under the circumstances, no contractual obligations have to be fulfilled by it, but it is also persuaded that armed assistance, offered spontaneously at the moment, would ill serve the common interests of

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the two States. It is for this reason that Greece had decided to remain neutral in the face of the general European Conflict. The common interests of the two States required that the Hellenic forces should be held in reserve with a view to their better utilization at some future time.

Although regretting that it could not afford Serbia material assistance the Hellenic Government desired to assure its Ally that Greece remained a faithful friend and would continue to give Serbia all the assistance and facilities compatible with her international position.

Within a month of the date of the preceding communication M. Skouloudis had succeeded M. Zaïmis as Greek Premier, and on the 8th November, 1915, he, following the example of his predecessors, sent out a telegraphic circular to the Greek diplomatic representatives informing them that the foreign policy of his Cabinet was that of the one it had succeeded. Other telegrams were sent on the date mentioned, wherein it was repeated that Greece intended to maintain her attitude of a neutral and expression was given to her sincere good-will towards the Entente Powers. Serbia was also informed that Greece would " continue to *provide her all facilities and every support compatible with our vital interests.*"

The Greek *Chargé d'affaires* in Serbia telegraphed, on the 15th November, 1915, to M. Skouloudis that he had communicated to the Serbian Premier the gist of the instructions sent him on the 8th October and 8th November, 1915, regarding the continuance of a policy of neutrality by Greece, *i.e.*, that no changes were to take place therein by reason of changes in the Cabinet. It is stated that the Serbian Premier had expressed his thanks for the information, and, at the same time, had added that the vital interests of Greece were identical with those of Serbia and he still hoped that Greece would intervene before it was too late.

The Greek *Chargé d'affaires*, on this occasion, also telegraphed the text of the reply of the Serbian Government to the case made out by the Zaïmis Cabinet for the non-intervention of Greece in the telegram sent to the Greek Ambassador on the 12th October, 1915. The Serbian Government naturally did not accept the interpretation put on the Treaty of Alliance by M. Zaïmis in his despatch to which reference is made. It pointed out, on the other hand, that the spirit and the text of the Treaty which guaranteed the integrity of Greek and of Serbian territory in no way indicated that the Treaty ceased to be inoperative as suggested by Greece, should Bulgaria act in alliance with another Power. On the contrary the text of the Treaty proved in a conclusive and logical manner that Greece was bound to come to the aid of Serbia *should the latter be attacked, without any provocation on her part, by Bulgaria or any other Power.* The Serbian Government had no doubt whatever that Bulgaria, in attacking Serbia, had no other object than to deprive the latter of the territories acquired under the Treaties of London and of Bukharest, and to prevent Serbia and Greece from having a common frontier. The object of the Treaty of Alliance with Serbia was to provide a guarantee for the maintenance of the situation created by the Balkan Wars, and the Treaty in question was entered into in order to ensure that Serbia and Greece would reciprocally come to the assistance

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of the other for the purpose in view. Article 1 of the Treaty made no reference whatever to the number of enemies, one or many, by which Greece and Serbia must be attacked to render the Treaty operative; it referred to *an attack* in general terms and not to the *number of Powers attacking*. It was hardly likely that if the question of one or a number of enemies had been before the framers of the Treaty that they would have provided for assistance being reciprocally provided by Greece or Serbia to the other only in the case where the smallest danger was threatening either of these States, and not in the case where the greatest danger threatened them. If the contention of the Zaïmis Cabinet was correct the Treaty would become inoperative just at the time that its provisions would be of most value to one or other of the parties thereto. The Serbian Government was of opinion that the attack on Serbia by Bulgaria had no other object than to alter the situation in the Balkans. Although an episode in the European War, the attack was an event eminently affecting the Balkan situation; it was submitted that the important question to be considered is not what may be the nature of the attack, but rather with what intention was it made and what were likely to be the probable consequences of such an attack. It would be immaterial if the territorial *statu quo* in the Balkans were secured by a purely Balkan War or by a combined European-Balkan War. In either case Serbo-Greek interests would, with an upset in the balance of power in the Balkans, equally suffer irreparable injury.

In breaking off diplomatic relations with Bulgaria, previous to arriving at an understanding with Greece on the subject, Serbia had no desire to consider the attack of Bulgaria in the light of a matter of European rather than Balkan interest; she only desired to emphasize that the Bulgarian mobilization was directed against herself. The reason why Greece was not consulted before the rupture of relations was due to the fact that Serbia had no choice in the matter. The rupture had become inevitable owing to the aggressive attitude of Bulgaria.

Further, it would seem, it was pointed out, that in ordering a general mobilization of its army without previous consultation with Serbia, Greece herself had acted in the same manner as Serbia had done. Moreover, the Hellenic Government had practically admitted that it might intervene in the present Serbo-Bulgarian Conflict, and therefore by its own showing the question of its intervention was not dependent upon the number of adversaries, one or two, Serbia might have to deal with. Greece admitted the possibility of her being required to intervene only where Serbia was being attacked *simultaneously* by two adversaries, but not where the two adversaries *acted in combination*. From the military point of view Serbia's difficulties would be the same in both cases; she would be obliged to fight on two fronts. In each case the military difficulties so far as Greece was concerned would be the same.

Then the Hellenic Government considered that the intervention of Greece *must take place at the opportune moment*. It was evident that intervention would be more opportune whilst Serbia and Greece were able to join forces and act combined than in the case where Serbia might first be defeated by Bulgaria or Greece isolated by a Bulgaro-German coalition.

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The Serbian Government also called attention to the repeated assurances that had been given by Greece that she would act should Bulgaria *first* attack Serbia. An intervention on the part of Greece which was *too late* would be equally fatal to Serbia and Greece alike, and for this reason the Serbian Government was making a last appeal to the Hellenic Government to intervene immediately.

The next telegram in the series bears date 10th April, 1916, that is to say, an interval of nearly five months elapses concerning which no light is thrown on the situation in Greece. On the date last mentioned, the Greek Ambassador at Paris telegraphed to M. Skouloudis informing him that the refusal of the Hellenic Government to facilitate the transport of the Serbian Army across Greek territory as requested by the British and French Ambassadors had caused considerable annoyance to the French Government and that under the circumstances M. Briand was not prepared to entertain the question of the loan of 150 millions asked for by Greece. M. Skouloudis was also informed that the French newspapers were suggesting the necessity of the adoption of coercive measures against Greece.

On the following day, M. Skouloudis replied to the Greek Ambassador at Paris stating that he was painfully surprised at M. Briand's statement; the Hellenic Government had not solicited a loan of 150 millions as the price for the violation of her neutrality, and the French Government had no justification for attaching such a signification to the Greek request for a loan. Financial assistance was asked for from the Western Powers owing to the economic disorganization in Greece. Complaint is made by M. Skouloudis that essential considerations were being overlooked and that Greece was being chastised by M. Briand merely because she refused to lend herself to a serious violation of her neutrality. Greece was not in a position to resist the pressure put upon her by a coalition of great Powers and she had been obliged to put up with a great deal *nolens volens*. For instance, the French transport *Jean Corbière*, having Serbian troops on board proceeding from Corfu to Salonika, had passed through the Corinth Canal, thanks to her innocent guise. The Greek Ambassador at Paris was instructed to have an official and amicable interview with M. Briand and to explain to him that Greece, placed between two groups of Powers, was obliged to submit to the recriminations, protests, and ill-humour of one of these groups each time the violation of her neutrality took place to the supposed advantage of the other; under these circumstances, says M. Skouloudis, the Greek Government cannot take up any other attitude than the one it has adopted.

The text of a *Note verbale* from the Serbian Government to the Hellenic Government, communicated by the Serbian Ambassador at Athens on the 20th April, 1916, is the next document included in the series. It relates to the transfer of Serbian troops from Corfu to Salonika. The Serbian Government appealed on the ground of humanity to the Hellenic Government to permit their transport overland as far as Patras.

On the following day, M. Skouloudis telegraphed to the Greek Legations at Paris and in London. He conveyed the information that a request had been made by the Serbian Government asking that Serbian troops

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might be permitted to proceed to Salonika overland *viâ* Patras, in order to avoid the risk of the destruction of transports by U boats, and that the Hellenic Government had found it absolutely impossible to accede to this request, and, moreover, was not prepared further to discuss the question. This information was forwarded for the personal information of the Greek representatives, and these were not to make use of it unless the subject was first raised by the British or French Foreign Minister.

On the 27th April, 1916, Skouloudis sent a telegraphic circular to the Greek Legations in London, Rome and Petrograd and therein conveyed the information that the British and French Ambassadors had called to see him in order to support the request made on the 20th *idem* by the Serbian Minister for permission for the conveyance of Serbian troops overland to Salonika. He stated that the Greek Government absolutely refused to allow the use of its railways for the conveyance of foreign troops. M. Skouloudis entered into the reasons that prompted Greece to act as she had done. " The conveyance of troops as requested would constitute," he says, " a most flagrant and most startling case of the violation of our Sovereignty and of our neutrality and would rightly be considered by the opposing belligerent group as a hostile act. It would interfere with the ordinary passenger and goods traffic. In spite of assurances to the contrary it would result in the establishment of cantonments close to our towns and the capital, leading to inevitable friction with the local authorities, causing inconvenience in matters of supply to the civil population, and creating serious difficulties in connection with the maintenance of order and in relation to the public health. It would finally lead to constant interference by foreigners with the public services and give rise to arbitrary acts and restrictions on the liberty of the subject, of which we have had a sad experience at Salonika and in Corfu.

" It was owing to the fact that the public appreciated the dangers to which the independence of the country was exposed," he continued, " that demonstrations were organized against the proposed conveyance of foreign troops overland. Although the public have put up with a great deal patiently, they have now been fairly roused and do not see the necessity why Serbia should be allowed the use of Greek railways for military purposes. Entente ships are journeying in the Mediterranean from Alexandria to Salonika, from Salonika to Marseilles, from Marseilles to Corfu, without experiencing much loss from the enemy's submarines."

It was felt that, under these circumstances, the civilized world would unanimously uphold the Greek Government in its refusal and as unanimously condemn as a monstrous abuse of force any attempt on the part of the Entente Powers to push aside Greece's refusal.

A request was made that the result of the interview following on the foregoing despatch should be telegraphed to M. Skouloudis.

On the same day M. Skouloudis communicated the contents of the foregoing despatch to the Greek *Charge d'affaires* at Paris and requested him to communicate the contents thereof to the French Foreign Minister as coming from himself. It was felt by M. Skouloudis that an official discussion would be useless in face of the obstinacy shown by the French Foreign Minister.

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The foregoing despatch is the final one in the First Part of the Volume. The situation disclosed by the documents published does not altogether redound to the credit of Hellenic statesmanship. At a time that Greece was seriously threatened by Bulgaria she sought, and urgently sought, the aid of Serbia and entered deliberately into a Treaty of Alliance providing for reciprocal military support. It must have been brought home to her from the reports of Capt. Stratigos, to which reference has been made earlier, that Serbia interpreted the Treaty, whilst it was still in an embryonic condition, to provide for something more than a defensive alliance to keep Bulgaria alone in check. Had Greece doubted the wisdom of entering into an engagement of the far-reaching character that Serbia had made it evident she intended the Treaty to be, it would have been more honest of Greece to have frankly informed Serbia at the time that the parties were not *ad idem* and that, therefore, there was no binding contract between them. However Greece was in dire peril at the time that the negotiations for the Treaty were in progress and could not do without Serbia's aid ; an impression is therefore created from reading the despatches in question that Greece was ready to make the fullest use of Serbia when she herself was in need of help, but on one pretext or another she attempted to avoid fulfilling her treaty obligations when Serbia was heavily pressed and hard put to it to keep her enemies at bay, and found it necessary to call for reciprocal treatment from Greece. The telegrams published further show that the relationship of King Constantine to Kaiser Wilhelm had a decided influence on the conduct of Greek foreign policy.

The first document published in the Second Part of the Volume is a telegram dated 10th May, 1916, addressed from Serrès by the Commandant of the Greek 6th Division to the General Staff at Athens. Therein it is stated that a Bulgar Commandant had informed a Greek officer that in view of an understanding between Mackensen and the Hellenic Government permission had been granted for Germano-Bulgarian forces to be moved up to any point of tactical or strategical importance, at least 2,000 yards distant from the Greek frontier, and that, acting on this authorization, the aforesaid Bulgar Commandant had occupied the heights commanding Lehovo ; that access to points on the frontier other than those occupied by the Bulgars would be allowed to the Greeks ; that Bulgarian troops had been forbidden to enter Lehovo, but it was hoped that some friendly understanding might be arrived at on this question.

The second document in this part of the Volume is a telegram dated 11th May, 1916, from the Greek War Minister to the Headquarters, 4th Army Corps, at Kavalla. Therein it is stated that the understanding arrived at with the Germans and Bulgars stipulated that in the Sector Ali Boutous-Seïmen-Kayassi, the Greeks were to withdraw to a distance of from 1 to 2 kilometres behind their frontier, whilst the Germans and Bulgars might occupy the frontier line, but were not to cross into Greece ; the object being to form a neutral zone in Greek territory *at the moment when the Germano-Bulgarian forces might have to defend themselves against the Anglo-French forces established on Greek soil.* It is stated that the small advances of the Germano-Bulgarians N. of Vétrina and Lehovo

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constitute a violation of the understanding in question and an instruction was sent that the Bulgar Commandant should be informed accordingly. The Commander of the Greek 4th Army Corps was further instructed to maintain friendly relations with the Bulgars and not to use force to eject them since the Greek Government would settle any matters in dispute. However, any attempt on the part of the Germano-Bulgarian troops to advance further into Greece was to be resisted by force of arms, if necessary. The Greek 3rd Army Corps was to conform to the instructions herein contained.

On the 12th May, 1916, M. Skouloudis telegraphed to the Greek Ambassador at Sofia informing him of the occupation of Greek territory N. of Vétrina and the heights of Lehovo and repeated the gist of the information and instructions contained in the telegram sent to Headquarters, 4th Army Corps, on the preceding day. The Greek Ambassador was instructed to request the Bulgarian Foreign Minister to arrange for the withdrawal of Bulgarian troops from Greek territory and to issue the necessary directions so that regrettable incidents might be avoided.

On the 22nd May, 1916, the German and Bulgarian Ambassadors presented practically identical Notes to M. Skouloudis, wherein it was alleged that Germany and Bulgaria and their Allies found themselves compelled to enter Greek territory in order to secure possession of the very important Gorges of Roupel, *owing to the offensive measures adopted recently by the Entente troops*. It was claimed that this step was solely a defensive measure and would be limited to what was strictly necessary from a military point of view.

The German and the Bulgarian Governments had no hesitation in giving the Hellenic Government the following assurances :—

1. The territorial integrity of Greece will be strictly respected.
2. The Allied troops will evacuate Greek territory as soon as military exigencies permit.
3. Greek Sovereignty will be respected.
4. Liberty of the individual, property, and the established religion will be respected.
5. An indemnity will be paid in respect of any damage done by the troops (of the two Powers) during their stay in Greece.
6. The Allies will maintain a strictly friendly attitude towards the inhabitants of the country.

The foregoing communications were received at the Greek Foreign Office on the 23rd May, 1916, and on the same day M. Skouloudis addressed a letter to the German Ambassador at Athens acknowledging receipt of his communication of the preceding day. The substance of the foregoing communication was repeated in this letter, which concluded with a paragraph noting the German assurances.

The communication from the Bulgarian Ambassador at Athens was briefly acknowledged by M. Skouloudis on the 24th May, 1916.

On the 27th May, 1916, M. Skouloudis addressed a telegraphic circular to the Greek Legations at Berlin, Vienna and Sofia, in which he stated that German and Bulgarian detachments had, on the previous day, crossed the Greek frontier at Koula, and to the N. of Demir-Hissar and had attempted to occupy the fort at Roupel, the garrison of which had

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offered resistance. Other detachments, numbering 25,000 men, had descended that morning into the Tsingueli and Vetrina Sectors and occupied the heights near Demir-Hissar and also the bridges at Struma and Demir-Hissar. The inhabitants had been seized by panic and were preparing for an exodus *en masse*.

This incursion into Greek territory was not, said M. Skouloudis, in harmony with the terms of the understanding arrived at between the German and Bulgarian and the Greek military authorities. The Hellenic Government desired to enter a vigorous protest against the action taken and insisted that orders should be given by the German Government and her Ally for the evacuation of the Greek territory invaded by their troops as early as possible. The Greek diplomatic representatives addressed were instructed to take action without delay and to report progress.

On the 28th May, 1916, M. Skouloudis addressed identical letters to the German, Austro-Hungarian and Bulgarian Ambassadors at Athens, in which the information contained in the telegraphic circular of the preceding day relating to the incursion of German and Bulgarian troops into Greece was repeated, and the diplomatic representatives addressed were requested to transmit to their Governments the information that the Hellenic Government desired to enter a most emphatic protest at the violation of Greek neutrality and at the same time demanded the immediate evacuation of the territories invaded by German and Bulgarian troops.

On the day following, M. Skouloudis sent a telegraphic circular to the Greek Legations at Paris, London, Rome, Bukharest, Petrograd and Constantinople and to the Consulate at Berne, wherein information concerning the invasion of Greece by German and Bulgarian detachments was repeated and attention called to the fact that the Hellenic Government had entered an energetic protest and had demanded the evacuation of the Greek territory invaded by the detachments in question.

On the 30th May, 1916, the Greek Minister at Berlin telegraphed to M. Skouloudis informing him that the Great General Staff at Berlin had publicly announced the advance of German and Bulgar detachments into the Gorges of Roupel, and also the retirement of the weak Greek posts on the frontier.

On the same day, the Greek Minister at Rome telegraphed to M. Skouloudis informing him that news was current in Italy concerning the Bulgarian advance into Greece and that the information had created a lamentable impression. The Italians had come to the conclusion that in Macedonia, as also in Epirus, Greece would give way to the Bulgars whether they were assisted by Austria or not and that no reliance could be placed on Greece, her deceptive promises and her illusory guarantees. And on the 1st June, 1916, the Greek *Chargé d'affaires* at Paris informed M. Skouloudis that the impression prevailed in France that the invasion of Macedonia had taken place in consequence of an understanding between Greece and the Central Powers. Information from German sources, he stated, appeared to confirm this view.

The recent advance of the Bulgars, and the passive attitude taken up

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by Greece had, said the *Chargé d'affaires*, effected a radical change in the situation. It was felt in France that Greece had abandoned her attitude of benevolent neutrality, and the Entente Powers, in consequence, considered that they had now full liberty to adopt any counter measures thought necessary; consequently General Sarrail had been instructed accordingly.

On the 3rd June, 1916, the Greek Ambassador at Petrograd telegraphed to M. Skouloudis, informing him that the occupation of Roupel and the Bulgarian advance into Macedonia had created great irritation against Greece in England and in France, as these measures appeared to have been adopted by prearrangement.

The next document in the series is an extract from the Journals of the Hellenic Chamber relating to its 53rd sitting held on the 5th June, 1916. On this occasion M. Skouloudis reviewed the events since the last sitting of the Hellenic Legislature. He stated that the War Minister had, on the 25th May, received information from the Commandant of the Greek 4th Army Corps at Kavalla to the effect that a mixed column of German and Bulgarian troops had invaded Greek territory near Roupel, Vetrina, etc., and that the Greek troops had opened fire on the invaders. In view of the fact that the invaders had definitely decided to occupy Roupel and that continued resistance on the part of Greek troops might result in a general conflict, leading to an abandonment by Greece of her policy of neutrality, orders had, he continued, been given by the Greek Government through the War Minister for the Hellenic troops to cease their resistance and for information to be conveyed to the German Commandant stating that in view of the invasion in force by the Germans the Greeks felt themselves compelled to retire and would therefore fall back carrying with them any stores, etc., which they could move. The Hellenic Government had, said M. Skouloudis, hastened to address an energetic protest to the German Government and her Allies against the acts committed.

M. Skouloudis further stated that in view of the rumours that were afloat he felt he was under an obligation to proclaim and affirm in the most categorical manner that no understanding existed between the Hellenic Government and the Central Powers on the subject of the incursion in question, an incursion which had not the acquiescence of the Greek Cabinet. In concluding his speech, M. Skouloudis announced that he ought not to omit to add that "*the character of the action taken by the Germans and Bulgarians invading Greek territory, according to the declarations which had been made on the subject, was such as to permit the Greek Government to make known that in their view the steps taken had an exclusively military object and in no way exposed the integrity or the interests of their country to any danger.*"

On the 6th June, 1916, a telegraphic circular was addressed by M. Skouloudis to the Greek Legations at Paris, London, Rome and Petrograd, wherein he attempted to justify the surrender of the fort at Roupel to the Germano-Bulgarian forces. He directed the diplomatic representatives addressed to deny as false the statement that Roupel was occupied by the Germano-Bulgarian troops by reason of an understanding on the subject with Greece. The diplomatic representatives were further

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instructed to inform the Entente Powers that they (*i.e.* the Powers) ought not to allow themselves to be taken in by these calumnious rumours, rumours which the Greek Cabinet and its predecessors had denounced with no uncertain voice.

The foregoing telegraphic circular is followed by the texts of two telegrams bearing the same date (6th June, 1916); they were both addressed to M. Skouloudis by the Greek *Chargé d'affaires* at Paris.

In the first of these telegrams the *Chargé d'affaires* states that he had just had an interview with M. Briand to whom he had handed the Greek protest and explained the views held by Greece as to the interpretation to be put on her attitude of benevolent neutrality towards the Entente Powers; put shortly, the explanation amounts to this:— The assumption of an attitude of benevolent neutrality on the part of Greece towards a Power did not render it incumbent on her to take military action against the adversaries of that Power. It was further stated that the French Premier, having read the Note handed him, had entered into a discussion on the situation, of which discussion a *résumé* is given.

M. Briand pointed out that the state of siege proclaimed at Salonika was due to the decision of Greece to offer no opposition to the invasion of her territory by the Bulgarian Army, for it was the Bulgarian Army alone that had entered Greece, the Germans not having sent any troops across the Greek frontier. In taking these measures, General Sarrail had advised General Moschopoulos that the King's *fête* day should be observed as usual; it was the Greek General who had countermanded the customary celebration. M. Briand had also repeated that the attitude of Greece had caused considerable astonishment, since the Hellenic Government had frequently declared that it had received assurances that the Bulgars would not invade Greece. He took note of the Greek denial that the occupation of Roupel was a measure concerted between Greece and the Central Powers, and added, should the Bulgars advance any further General Sarrail had instructions to take all the necessary steps to safeguard the position of the troops under his command. The French Premier considered that the object of the Bulgars was palpable. Having possession of Serbian Macedonia, they wished to lay hold also of Greek Macedonia in order to provide for their "combination" at a future date. Holding the keys of the gates leading to Serrès, Drama, Kavalla, they could reach those places whenever they felt it to be opportune to do so. They were not advancing thereon at the moment, since their flank would be exposed to the attacks of the Entente troops.

In the second telegram, the *Chargé d'affaires* states that, in view of the serious nature of the tension existing between Greece and the Entente Powers, he considered it desirable to explain the situation as it appeared to the minds of the official and non-official classes at Paris with whom he was in contact. First of all, it should be borne in mind that M. Briand's attitude was dictated by considerations affecting foreign as well as internal relations. Since the invasion of Greek territory by German and Bulgar troops, without effective resistance on the part of Greece, and the conviction formed, in consequence, that an understanding existed

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between Greece and the Central Powers, the French Premier appeared to be haunted by the recollection of the unfortunate dealings France had in the past had with Bulgaria and he feared that similar deceptions might be practised on him by the Greeks. To guard against any subsequent accusation that he had shown himself as too soft in his dealings with Greece, M. Briand had taken the initiative in adopting rigorous measures, of which the proclamation of the state of siege at Salonika was but the prelude, so it was feared. The phrase "if Ernest Renan were watching over the Acropolis all this would not have happened," coming from a journalist as it did, was sufficiently characteristic, and the semi-official Press was harping on the similar theme, saying that the Germans alone knew how to show themselves strong and that Orientals were only to be cowed by a display of force.

The suggestion that there was an understanding between Greece and the enemies of the Entente in relation to the occupation of the fort at Roupel was not credited in the "Exchange" agency telegram; a statement in the *Neueste Nachricten* of Munich was really responsible for creating the impression that an understanding existed between Greece and Bulgaria, and that not only as regards the invasion of Greek territory, but also in respect of other matters in dispute between the two countries. The official *Wiener Allgemeine Zeitung* had just published some information which was being accepted as a confirmation of the report concerning a Greco-Bulgar understanding.

The French Government, although it felt that Greece might not have been able to prevent by force the invasion of its territories by the Bulgars, yet had hoped that she might have forestalled the invasion by diplomatic means. Having been disappointed in this respect, the French Government had come to the conclusion that an understanding of such a kind did exist between Greece and the Central Powers that even the occupation by the Bulgarian Army of the Macedonian regions coveted by Bulgaria caused the Hellenic Government no misgivings. It is pointed out that the outcries on the part of a section of the Italian Press had not remained without result. Further, the accusation that the raising of the new loan by the National Bank was only rendered possible by the aid given by Germano-American financiers was being widely repeated in France and naturally was having effect on French public opinion.

A somewhat mysterious official memorandum dated 20th June, 1916, prepared by the Director-General of the Greek Foreign Office, is included in the volume. In this memorandum it is stated that the official documents relating to the surrender of Roupel, forwarded by the Bulgar Government and received at the Ministry, make no mention of restitution. These documents go no further than to state that the occupation will not affect the Sovereign rights of Greece. "But," says the writer of the Memorandum, "as the Premier has informed me that there are documents in his possession promising, on behalf of Germany and of Bulgaria, the restitution of the fort, I asked him, a few days ago, to file these documents with the official correspondence in the Ministry. The Premier said that he would do so when it was opportune. I have to-day again reminded him of the necessity for filing the same, as well as that of registering the correspondence relating to the surrender of the

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fort at Roupel, correspondence which has not yet been received in the Ministry. The Premier has repeated his promise to file the documents in question."

An entry in the Register of confidential letters of the Ministry of Foreign Affairs for 1916 is also published in the volume under review: it relates to a letter received on the 22nd August, 1916, from the German Legation. Under the heading "Precis of document received" the record runs:—"That the Germano-Bulgar troops will not enter the towns of Drama, Serres and Kavalla." In a footnote the statement is made:—"This document has not been discovered in the archives of the Ministry."

M. Zaïmis had once more become Greek Premier and Minister for Foreign Affairs, and, on the 28th August, 1916, he was informed in a letter from the German Ambassador at Athens that the Greek troops had handed over the forts and batteries in the Kavalla District of their own accord to the Bulgars and that the latter had taken up positions round the town named but were outside its boundaries.

The document that follows the foregoing letter is a report dated 10th September, 1916, from Lieut.-Colonel Troupakis, Commandant of the Macedonian Gendarmerie, to the Greek Foreign Office. This report deals with the Bulgar invasion into E. Macedonia. It gives an account of the excesses committed by the Bulgars who, according to Lieut.-Colonel Troupakis, "allowed no occasion for the manifestation of their hostile disposition as well as their criminal instincts to escape them." The details of a number of the atrocities committed by the Bulgars are set out in the report.

On the 18th December, 1916, the Greek Ambassador at Sofia sent a telegram to the Greek Foreign Minister giving details of the maltreatment of Greek subjects in the territory invaded by the Bulgars.

Eight days later the Greek Foreign Minister telegraphed to the Greek Ambassador at Berlin informing him that he had received information through Sofia of the terrible plight of Greek citizens in the provinces occupied by the Bulgars; pillage, robbery, destruction, murder were rampant there. Instructions were sent for immediate representations to be made to the German Government calling upon it to put an end to the deplorable state of things reported and for a request to be made for the administration of the occupied region to be taken out of the hands of the Bulgars in order that it might be placed under German officials.

Further telegrams were sent on the 14th January and 28th February, 1917, by the Greek Ambassador at Sofia to the Greek Foreign Minister dealing with the unfortunate condition of the Greek subjects who were under the yoke of the Bulgars in the occupied provinces.

A fairly comprehensive report, dated 9th March, 1917 (O.S.), by a higher official belonging to E. Macedonia is published in the volume. It was transmitted from Germany to the Greek Foreign Office through the Hellenic Legation in Berlin. From its perusal a very good idea is obtained of the excesses committed by Turks and Bulgars in the occupied provinces; pillage, extortion, arbitrary confiscations prevailed side by side, and, in addition, the prices of corn and prime necessities were artificially enhanced by the invaders.

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The volume is brought to a close by the inclusion of three communications dated respectively 9th April, 5th April and 14th June, 1917. Addressed by the Greek Ambassador at Sofia to the Greek Foreign Minister, they all deal with the critical situation in E. Macedonia where the people were dying in hundreds of hunger, whilst neither Bulgaria nor Germany moved a finger to ameliorate the lot of the unhappy people brought temporarily under their rule.

Although the immediate responsibility for the crimes committed against the unfortunate inhabitants of E. Macedonia undoubtedly rests on the shoulders of the German and Bulgar Governments, yet a careful study of the documents published in the Second Part of the volume creates a distinct impression that it was largely the fault of the successive Greek Governments, in not dealing with the Bulgar menace properly, that the situation was allowed to come into existence which has brought such an infinity of misery on thousands of helpless Greek subjects.

The object of the inclusion in the Volume of the official memorandum of the Director-General of the Ministry of Foreign Affairs and the extract from the Foreign Office Register of confidential letters is not explained; it would certainly have been in the public interest to clear up the mysteries connected therewith.

The record contained in the Hellenic White Book of the events between 5th May, 1913, and 14th June, 1917, to which the documents contained therein relate is not of a nature to give any high-minded and patriotic Greek either comfort or satisfaction.

W. A. J. O'MEARA.

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NOTICES OF MAGAZINES.

REVUE MILITAIRE SUISSE.

No. 1.—*January*, 1918.

COMPARISONS AND CONCLUSIONS.

The Morale of Our Army.

The author of the original article states that, having spent many months on the fronts held by the troops of the Central Empires, on his return to his Homeland he attempted to picture to himself the sort of a show the Swiss Army would be likely to put up had it to go through the dangers, trials and difficulties of War. The Swiss soldiers presented a marked contrast to those war-stained heroes he had left behind; they showed in their appearance the lack of contact with the realities of their calling. But the Swiss soldiers he met with at the Swiss frontier and on his railway journey home created a very reassuring effect on his mind. He has continued ceaselessly to keep an eye on the Swiss Army since his return to Switzerland, and to compare his military compatriots with the fighting men of the Central Empires. He has been struck with the appearance of homogeneity, the suppleness and mobility of the Swiss troops, and their splendid trim; he considers the Swiss Army, after its three years and more of training, to be comparable to the active armies that have been hammering away at each other since the beginning of the War. The troops now engaged at the fronts are rapidly trained militia, whilst the Swiss troops are practically in that condition to-day in which were the permanent armies of the belligerents when they took the field in August, 1914.

Such is the external aspect of the situation; the comparison, says the author of the *Revue* article, is far from being to our disadvantage. There remains the anxious question: What would be the War value of our Army should it have to take the field? In attempting a reply one has to fall back on suppositions. Is the Swiss Army ready in matters pertaining to *matériel* as well as regards *morale*?

For self-evident reasons the state of preparation of the Swiss Army as regards *matériel* cannot be discussed, but it can be definitely stated that the complicated questions relating to supplies of food and munitions, remounts, transports, equipment, utilization of all the resources of the country have been carefully studied, and also that precautionary measures have been adopted of a kind that should inspire confidence in the Nation.

The Swiss Army is provided with the necessaries for the conduct of War; however, the questions arise: But, this being granted, is it ready in other respects to undertake active operations? Can it make good use of the expensive and up-to-date *matériel* in its possession?

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The answers to these questions depend on the methods of training adopted, the instruction of the soldier for the part he may be called upon to play on the battlefield ; it is in this instruction that the keystone to the *morale* of an army is to be found.

Opinions on the foregoing matters are much divided in Switzerland. There are some who feel that all the progress which could have been made has not been made ; some there are who are distinctly perturbed regarding many matters connected with the Swiss Army.

As in other *métiers* so in the Army, nothing can make up for lack of practical experience. An army taking the field at a later period of a struggle than others naturally finds itself at a great disadvantage for a time, until, indeed, it has got over its first emotions after coming into contact with a new state of existence, until the intense tension on the nerves of the men has been relaxed. It is only on the battlefield that the training which is to develop the soldier's *morale* can receive the finishing touches. The Roumanians had to learn this cruel lesson.

However, non-belligerents can by paying attention to the practical lessons afforded by a War do much to enhance the *morale* of their soldiers. The author of the *Revue* article tells us that there is a concensus of opinion among Swiss officers that sufficient is not being done in Switzerland in connection with the training of the Army to prepare it for a War of the kind now in progress on the Continent of Europe.

Reference is made to the reports sent in by Swiss officers from the various theatres of operations which they were permitted to visit. These reports, which are, of course, confidential, describe the methods of training in vogue behind the lines on all fronts, and it is understood that recommendations have been made that similar practical methods of training should be introduced into the Swiss Army. The delay in introducing reforms is causing some to lose their patience. The Swiss Press has taken up the question ; two interesting articles on the subject entitled *Questions Militaires* and *Le Moral de l'Armée* have appeared in the issues of the *Journal de Genève* for 28th August and 8th September, 1917. The authors of these articles are officers who have not hesitated to express their opinions with considerable frankness. In both the articles it is stated that the Swiss Army is marking time and that its training is being carried out on lines in which the experiences of the present War are ignored. There is not any variety in the instruction provided for in training programmes prepared from time to time ; sufficient attention is not paid to instruction in trench warfare ; bayonet training is not carried out on practical lines ; instruction in bombing should proceed simultaneously with other specialist training.

The excellent brochures published by the Swiss General Staff should, it is suggested, form the basis of a practical manual on training, a manual which has yet to be compiled.

The discontent in the Swiss Army has provided the theme for innumerable political harangues, brochures, discussions on the part of journalists. Some have taken up the subject solely to serve their political ambitions, others have examined the question in order to seek a remedy. Numerous explanations have been given to account for the lowered *morale* of the troops ; too much " drill," the leave of absence

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question, absence of tactful dealings on the part of certain officers, the military "scandals," economic difficulties, the weather, the political situation at home and abroad.

The following are held to be the chief causes of the trouble and those requiring special attention :—

1. *The continual changes in the methods of imparting individual instruction to the soldier.* The disregard that many officers show for the regulations produces, it is said, a sense of uneasiness and insecurity in the troops. The soldier, having learnt first to do a thing one way, finds that as soon as he has acquired the knack sufficiently to give satisfaction to his instructor, he has to unlearn what has been drilled into him in order to acquire skill in doing the same thing in some other way. And so it goes on, method two having to give way to method three, etc. It is a case of " yer don't know where yer are " with the Swiss Tommy. The Swiss Infantry Training Manual consists of two parts: the first relates to *training*, a subject in which no one has a right to introduce modifications. The second part deals with the *Combat* and lays down tactical principles, providing rules which are merely to act as a guide. No departure is permissible from the rules sanctioned in the first part ; the infringement of a regulation is tantamount to a disobedience of orders. Yet many unauthorized innovations have been introduced in the Swiss Army, in spite of the strict prohibition contained in the *Training Manual* against a departure from the rules and methods therein contained.

Many officers in direct contact with the troops are of opinion that it is absolutely necessary that a return should be made to the methods, etc., laid down in the regulations.

2. *The attitude of the Press towards military questions has at times been responsible for the lowering of the morale of the Army.* But the fault has not always lain at the door of the journalist ; had he been better informed and better treated by the military authorities he would have been enabled to keep the people better informed on military matters. Instead of keeping journalists systematically at arm's length, the military authorities should on the contrary encourage them to see things as they are, without, of course, giving away information concerning national defence which ought to remain secret.

3. *The antimilitarist propaganda is beginning to make its influence felt.* It is necessary to have courage to face facts. If measures are adopted to combat this danger with but half the energy and perseverance employed in the propagation of treason, antimilitarism would be deprived of its poison. Propagandists know that they can count on the inertia of their adversaries ; they exploit with considerable skill all those factors which contain the germs wherefrom discontent is bred : a hard life, petty injustices, the abusive tongue of an officer, fatigues, stoppage of leave, the petty annoyances to which a soldier may be subject. Soldiers are got at by pacifists and the spirit of hatred and exasperation are breathed into their hearts ; no one entirely escapes their pernicious attentions.

It would seem that an organization with anarchical tendencies is in existence whose ramifications extend into all countries. The democratic socialists too find that *demi-intellectuals* and anarchists are ready

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to swallow their crude theories on life. Proclamations have been secretly circulated in Switzerland which are but a disguised appeal for the formation of a "Soviet" in the Helvetic Republic. Officers of all ranks are urged by the author of the *Revue* article to join forces to combat this mischievous propaganda. By maintaining proper discipline they can assist in making soldiering a tolerably pleasant form of existence. *Ennui* is the main cause of discontent in every sphere and calling of life; it is necessary to banish it from the life of the soldier. Side by side with his professional occupation, the soldier should be provided with distractions of a healthy kind. Variety should be sought after in these distractions, so as to suit the tastes of all.

4. *A wide feeling exists in the minds of the Swiss soldiers that the public are neglectful of them.* They have noticed the enthusiasm and sympathy of the public for the interned foreigners and the wounded heroes, and unconsciously this has made them a little jealous. Further, they have been subject to some petty annoyances in connection with travelling facilities at half fares, railway journeys on Sundays, etc.

5. *The Swiss soldiers are beginning to fret at having been kept so long on peace duties under active service conditions.* "A modern Army," says Alfred de Vigny, "as soon as it ceases to be at War becomes a sort of gendarmerie. It seeks its true life everywhere and cannot find it." The Swiss Army cannot escape from this destiny devoid of glory.

The author of the *Revue* article states that the views expressed above on the *morale* of the Swiss Army are somewhat gloomy, but they represent faithfully the impressions obtained by him from contact with officers and men in all parts of Switzerland. Those who repeat the cry of anguish are neither pessimists nor alarmists, but members of the army who are too devoted to their profession to maintain a silence which would jeopardize its welfare.

However, without being in a position to say what the Swiss Army is capable of doing in the field, it possesses, says the author of the original article, latent energy, dignity, patience and, above all things, high spirits. After having touched upon the ills it is suffering from and having shown that the burden of neutrality is a heavy weight to carry, it is but just to recognize the spirit of sacrifice exhibited by all ranks, that modest sacrifice which is without hope of reward human or divine.

That progress has been made by the Swiss Army in fitting itself for the field is incontestable. The men have a more soldierly bearing; the lower commissioned ranks have acquired professional knowledge and habits of command; the troops are able to march long distances and put forth a sustained effort; they have become mobile and can rapidly deploy into fighting formations, even on very accidented ground; co-operation between the several arms is no longer merely the theoretical ideal of the lecture theatre; heavy artillery, of which there was practically none in 1914, has been provided; aviation services have developed in a uniform manner; infantry and cavalry have been provided with machine guns; the Swiss medical services have applied the lessons of the present War to effect improvements in their own organization, etc.

To the question: "Are we ready?" answer given is: "Yes if we

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know how to make the fullest use of the high qualities of our soldiers; if we satisfy their legitimate wish to be properly trained for trench warfare; if we fight, otherwise than as an ostrich with its head buried in the sand, against those occult forces which are seeking to disorganize our national defence; if the military authorities instead of looking upon the Press as an enemy change their attitude and endeavour to obtain its collaboration. When Swiss officers have made up their minds to read and give implicit obedience to regulations; when *incorrect drill* has disappeared, with all the chicanery following in its train, then shall we be ready as far as it is possible for an army, which has not been under fire, to be ready."

The armies of the belligerent powers possess the immense advantages arising from familiarity with the actual conditions of a battlefield; but their quality, says the author of the *Revue* article, is certainly inferior to that of the Swiss Army. It is by the *landsturm* and hastily-trained militia that the present War is being fought. The Swiss Army is still intact; it consists of the *élite* and the picked manhood of the Nation.

The reasons for considering the belligerent armies of to-day inferior to those with which the War was begun are stated to be:—

1. Their training has been superficial, owing to the high pressure at which it has been carried out.

2. The great admixture of elderly and very young men, of men incapable of prolonged physical exertion.

3. The existence of many improvised units and formations.

It is stated that, in spite of the vicissitudes it has passed through and the terrible losses suffered by it, the *morale* of the Austro-Hungarian Army remains at a high standard.

Shell Holes.

The *Revue* article is accompanied by two photographic reproductions from the *War Album* published by Stilke of Berlin and a sketch-map of a part of a position, consisting of advanced posts in shell holes, 1st, 2nd and 3rd lines of defence. The author of the original article states that he has no desire to open a discussion on the new principles of trench warfare, or to put forward a theory no longer open to discussion; he merely wishes, in his article, to point out the *rôle* which shell holes are playing on the battlefield to-day. He has, in consequence, brought together the information on the subject which has been published and that which has been communicated to him by playmates of his youth who have been fighting in Flanders.

The intensity of belligerent activity naturally varies at different parts of the front. Similarly, there is great diversity in the character of the defence arrangements provided along the various portions of the front. On some portions of the front complete defences are provided, having a considerable depth and consisting of many lines of resistance. An attempt to pierce these lines would be futile. But here no such attempts are made; the defenders wait on and observe. Occasionally small raids take place to relieve the monotony of those on guard in the trenches in such a sector.

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In other portions of the front no first line exists from which a daily and nightly watch has to be kept throughout long months. It is there that one finds the battlefield with all its turmoil. Nothing remains standing, nothing is in a state of stable equilibrium. All is in a condition of perpetual motion; engagements, local scraps, raids, attacks and counter-attacks no longer allow an opportunity for the establishment of a fortified line. It is impossible, indeed rash, to attempt to dig there. The opponents watch one another in the same way that wild beasts do preparatory to a spring at each other.

On an active sector, everything is smashed about, the surface of the ground torn by artillery projectiles. Everywhere are to be seen *débris* heaps, holes in the ground, innumerable craters of varying depth and diameter. The convulsed, heaving, trembling surface of the ground resembles an angry sea.

The shell holes in which soldiers have often passed a miserable existence during these many months past, have not only become a useful adjunct to a defensive system, but they are now even an essential and indispensable part of a fortified front. Their utilization marks a new phase in the evolution of tactics, in the handling of troops, in the adaptation of the *terrain* for tactical purposes and in the utilization of the features of a battlefield. In the latest developments of field fortification, the foremost line of defences no longer consists of solid parapets and deep trenches; its place has been taken by a system of shell holes. The rigidity, regularity and continuity of the first line is a thing of the past. Lines of trenches, following the contours of the ground and having a clear field of fire to the front, have disappeared.

Belligerents are now provided with their first line of defence by the artillery fire of their opponents; there is no longer any need to cogitate as to the siting of one's first line trenches. Shell holes give shelter and protection to two, three or more men who are there able to give one another mutual support and to remain inseparable during the various stages of the combat; often, even in death they are not parted. High moral and physical qualities are required in the men who have to garrison shell holes. A will of iron and nerves of steel alone enable them to hold on and put up a fight for whole days together, subjected as they are to terrible bombardments at times and surrounded by nauseating scenes.

The shell holes play the part in a defence similar to that played by the antennæ with which some insects are provided. Shell holes nearest the enemy are utilized as listening posts, little further back are the shell holes occupied by the patrols, behind these again are the shell holes, protected by obstacles in front and on the flanks, which have often been strengthened and improved on a systematic plan during the night. The defence of positions so organized is a comparatively simple matter, since the various shell holes flank and support one another. Should any of the enemy be bold enough to occupy one of the craters here or there, the garrisons of the nearest shell holes soon bomb the intruders out.

Artillery fire is not very effective against a shell-hole defensive system; but few prisoners can be taken in the event of a successful raid thereon. In order to gain a real advantage an enemy must succeed in obtaining

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possession of a complete shell-hole area; the seizure of one or two lines of shell holes alone will serve no useful purpose.

It is difficult for artillery to observe the effect of its fire against a shell-hole system, and often an artillery bombardment strengthens rather than weakens such a defensive position. The main disadvantage of a shell-hole system from a defence point of view is the difficulty experienced in pushing up supplies of food, water and ammunition for the garrisons of the individual craters.

NOTES AND NEWS.

Switzerland.—The death is announced of Colonel Eugene Fahrländer at the age of 64; the deceased officer was on the retired list. Colonel Fahrländer commanded the Swiss 2nd Army Corps from 1898 to 1909.

The sad case of Major Maurer, commanding the 137th Battalion of Infantry, is mentioned. He was tempted to give countenance to the smuggling of contraband across the Austro-Swiss frontier, and yielded to the tempter. He was tried for his offence by the Tribunal of the 6th Division and sentenced to 18 months' imprisonment, degradation and dismissal from the Army, and deprivation of civil rights for two years. Unfortunately, there are other similar cases *sub judice* at the present time. The virus of corruption unfortunately has found a weak spot in the Swiss Army, but the body as a whole is too healthy for the disease to spread.

The shortage of paper has rendered it impossible for the *Revue* to publish its customary list of promotions in the higher ranks of the Swiss Army. However, the appointment of Colonel Biberstein to the command of the 2nd Division cannot be passed over in silence.

The debate in the Federal Chamber on the relations of the civil and military power did not take place; instead the deputies devoted their time to a discussion on the subject of pacifism and the abolition of the Army.

In view of a somewhat widespread movement, having pacifism for its creed, the question arises, it is said, whether the Swiss are witnessing the arrival of an era of decadence, or even the birth of an age of mysticism. In either case the results are likely to be the same; mysticism and decadence, by one road or another, lead to the same end: death.

Attention is called to the latest issues of the series entitled *Histoire Militaire de la Suisse* edited by the Swiss General Staff; the two volumes of *Der Weltkrieg*, edited by Orell Fussli, and the brochure containing *Chants de soldats* distributed to the Swiss soldiers on the frontier at Christmas.

United States of America.—Two modifications of an extremely important character in the laws and regulations relating to the American Army have taken place. It is pointed out that the organization of a division of three brigades and nine regiments of infantry is not suitable for European warfare. Further, a company of infantry with an establishment of 150 rank and file is too weak for a campaign in which the wastage is as high as in the present War. General Pershing has made

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certain recommendations on the subject. The American Infantry Division is, in consequence, now to be composed as follows :—

	Numbers of all ranks.
Divisional Staff	164
2 Infantry Brigades, each comprising 2 regiments of infantry and 1 machine-gun battalion (3 companies)	16,420
1 Divisional machine-gun battalion (4 companies) ...	768
1 Artillery Brigade consisting of 3 regiments of field artillery and 1 trench-mortar battery	5,068
1 Battalion of signallers	262
1 Engineer regiment	1,666
Total	24,348

To the foregoing must be added the train as follows :—

Administrative staff and military police	337
Ammunition Column	962
Supply Column	472
Engineer train	84
4 Field ambulances and 4 field hospitals	949
Grand total	27,152

The proportion of artillery has been more than doubled in above as compared to the original establishment of this arm in the American Division ; the number of machine guns has also been increased from 54 to 168 (14 companies of 12 guns each instead of 9 companies of 6 guns each).

The establishment of the infantry company has been raised from 150 to 250 all ranks ; it is organized as follows :—

Company headquarters, 2 officers and 18 other ranks.

4 Platoons each consisting of :—

(*a*). Platoon headquarters, 1 officer and 1 other ranks.

(*b*). 1 Section of bombers and grenadiers, 22 other ranks.

(*c*). 2 Sections of fusiliers, each of 12 other ranks.

(*d*). 1 Section of automatic rifles, 11 other ranks and 4 automatic rifles.

The establishment of an infantry battalion is 1,078 all ranks ; that of an infantry regiment approximately 3,750 all ranks ; each regiment has, in addition to the 12 ordinary companies (250 all ranks), the following :—

	All Ranks.
1 Machine-gun company	178
1 Supply company	148
1 Headquarters company consisting of :—	
(*a*). 1 Headquarters platoon (clerks, batmen, bandsmen, etc.)	93
(*b*). 1 Platoon of signallers and telephonists ...	77
(*c*). 1 Platoon of sappers and bombardiers	43
(*d*). 1 Platoon of pioneers	55
(*e*). 1 Platoon of gunners (in charge of the 3 regimental guns)	33

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The American Army consists of three distinct parts :—

1. The Regular Army.

2. The National Guards of the several States, now under the Federal Government.

3. The National Army, raised by conscription.

The Regular Army is already partly in Europe ; the National Guard is concentrated in the Southern States and will probably be transferred to Europe in the spring ; the National Army is quartered in immense cantonments in various localities. Everything has been done to make the life of the men comfortable and healthy. Each of the cantonments can house about 40,000 men.

The divisions, brigades, regiments and battalions have been numbered in such a manner as to lead to their easy identification in the organization adoption.

Certain difficulties have been met with in organizing the National Guards owing to the particularism which has existed in the past, but laudable efforts have been made by the military authorities to meet the situation without creating friction.

Everything is tending towards the unification of the American Army.

The problem of finding officers has not been difficult of solution from the point of view of the provision of the numbers required. The reserve of officers, schools for officer cadets, etc., have proved to be suitable reservoirs from which the commissioned ranks can be kept up to establishment. There has naturally been accelerated promotion in the higher ranks of the American Army.

INFORMATION.

The Intervention of Japan.—The defection of Russia has revived the question of the employment of the Japanese Army in the European War. The two following facts have contributed to hasten the necessity for a decision on the subjects :—

1. The defeat of Italy, in consequence of the Russian defection.

2. The return of MM. Clémenceau and Pichon to power.

M. Pichon has always been a strong partisan in favour of the intervention of Japan. In the transfer of the Japanese Army to Europe he sees an enhancement in the moral forces and an increase in the means at the command of the Entente Powers, factors which should tend to shorten duration of the World War. Recent military and political events instead of converting him have strengthened his original views on the subject.

Should the intervention of the Japanese Army be seriously considered as a possibility, the following questions of military importance would arise :—

1. What number of troops will Japan provide ?

2. In what theatre of operations is her assistance possible and desirable ?

3. What total number of troops is Japan in a position to provide ?

The Empire of the Rising Sun possesses an army to-day equal in efficiency to that of any of the belligerents ; its reputation is such as to require no words of comment here.

In the early days of the War, before the U boat menace had reached

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the dimensions it has to-day, the transport of the *whole* of the Japanese Army from the Far East to the Western Front would have been a comparatively easy matter. This is no longer the case to-day. Further, the Russian situation is such that the transfer of the Japanese Army to the Eastern Front no longer comes within the purview of practical politics. Consequently the question that has to be decided consists in determining where a *part* only of the Japanese Army can be utilized to the best advantage and not that of considering the employment of the *whole* Japanese Army in the West, South, or East.

The following are the main considerations to which weight has to be given in an examination of the situation on each of the fronts for the purpose of arriving at a decision regarding the co-operation of the Japanese Army with those of the Entente Powers.

Eastern Front.—In the present state of Russia this front may be wiped out from one's calculations altogether. Even in the days prior to the existing chaos in Russia it would have been a somewhat delicate experiment to have utilized the Japanese Army on the Eastern Front. However, this front no longer exists and there is little or no prospect of its being reconstituted.

Western Front.—In 1915, in 1916, and in 1917 the presence of Japanese troops in reserve on this front would have been of inestimable value. On many an occasion during the years in question ten fresh divisions of keen born-fighters launched at the opportune moment would have turned what proved to be but partial successes into the decisive victory for which the Entente Powers have been waiting in vain these three years and more past.

In this fourth year of War, though it would be enormously to the advantage of the situation to have Japanese troops on the Western Front, the transport difficulty is so great as to render their employment there out of the question.

Further, a great Babel reigns on the Western Front already, owing to the variety of races congregated there, and the addition of one or more Japanese Armies would increase the difficulties at present experienced from the "Confusion of tongues."

Balkan Front.—On this front also there is a "Salmis of Armies," Serbs and Greeks taking the place of the Belgians and Portuguese on the Western Front.

The Entente Armies on this front have not a very important *rôle* assigned to them. Further, Macedonia is a theatre presenting enormous supply difficulties. On the whole the Balkan Front does not appear to afford a suitable field for the employment of a Japanese force.

Palestine and Mesopotamian Fronts.—Of the three theatres of operations of which these fronts consist, the Armenian theatre may be left out of consideration for the same reasons that the *Eastern Front* has been eliminated.

It is on the Palestine and the Mesopotamian Fronts that the Japanese Army might, in the opinion of the contributor of the original notes, be most usefully employed. The lines of communication from Japan to these fronts are shorter and safer than to the other fronts in which Japanese troops could be advantageously employed. The intervention

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of Japan on these fronts would admit of a better distribution of the British forces and their employment on fronts more accessible from their base.

The utilization of Japanese troops, although extremely difficult, if not impossible, on other fronts, is nevertheless possible in the Asiatic dominions of Turkey and their employment there seems to offer many advantages. If an early decision could be arrived at, and effect given thereto without delay, Japan could yet play an important and decisive part in securing the dominion of Right over Might.

The Editors are issuing, as a *Supplement* to the *Revue*, a French translation by M. Michel Epuy of Lord Ernest Hamilton's work on *The First Seven English Divisions*. The first portion of this translation accompanies the number of the *Revue* under notice, the narrative deals with events up to and including the passage of the Aisne. The chapter relating to Troyon is also begun in this part of the *Supplement*. There are two or three curious explanatory notes by the translator, *e.g.* R.F.A. is said to be equivalent to "Royal Fighting Artillery" (p. 21) and R.E. is stated to stand for "Royal Engineering" (p. 88).

W. A. J. O'MEARA.

RIVISTA DI ARTIGLIERIA E GENIO.

October—November, 1917.

The incendiary rocket represented below is officially called Brandrohr. It consists of an iron tube closed at one of the ends with two metal caps, one of lead, and the external one of iron.

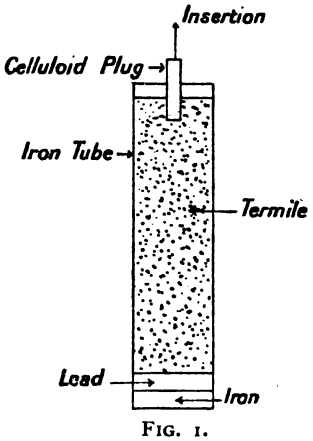

FIG. 1.

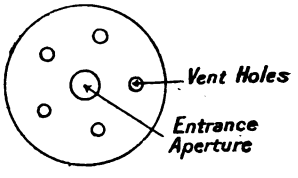

FIG. 2.

The tube is filled with termite and closed at the upper end with a plug of celluloid provided with a central hole for insertion and five perimetral apertures for vents.

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As is known, termite is a mixture of dust of aluminium and oxide of iron, which when it burns gains a temperature of 3,000 C. The incendiary rockets with termite are of two dimensions ; the greater is about 50 cm. in length with a diameter of 10 cm. ; the smaller is 40 cm. long and a diameter of about 5 cm.

The Scientific American da La Science e la vie refers to the above means of specially constraining troops in dug-outs to evacuate them and to surrender. For this purpose the rocket is attached to a long pole which is introduced into a dug-out—*Fig.* 3—and ignited by friction at the

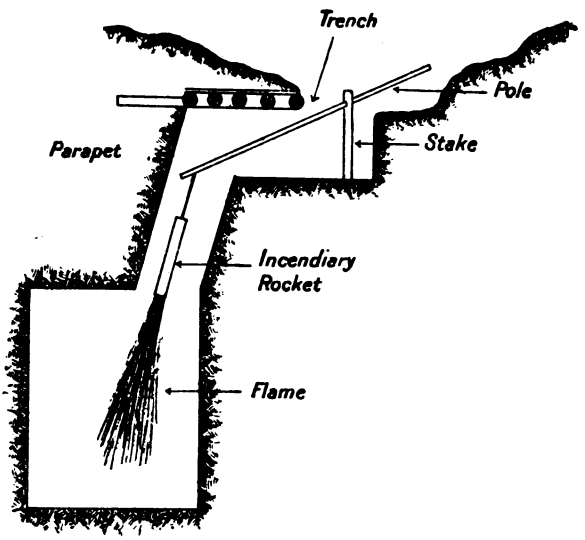

FIG. 3.

entrance cavity. For this rocket or incendiary tube then may be substituted flame throwers at a more limited distance.

E. T. THACKERAY.

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CORRESPONDENCE.

THE NILE BARRAGE AND THE LATE COL. WESTERN, C.M.G., R.E.

To the Editor, "R.E. Journal."

DEAR SIR,

Since the publication of my husband's (Sir Colin Scott-Moncrieff) life last autumn, surprise has been expressed that the name of Colonel J. H. Western, C.M.G., R.E., is not given in connection with the Nile Barrage.

The omission is inexcusable, and much regret is felt for it by our family and myself. It should have been made clear in the book that Colonel Western, with his assistant Mr. Reid, came from India expressly to take charge of this great work. Sir Colin had the responsibility of deciding that it should be undertaken and his name became associated with it, but he would have been the first to wish that the credit of carrying through to success this very difficult job should be given where it is due.

If these few lines can be inserted in the *R.E. Journal* our regrets will at least find some expression.

Yours faithfully,

M. D. SCOTT-MONCRIEFF.

11, Cheyne Walk, Chelsea, S.W.
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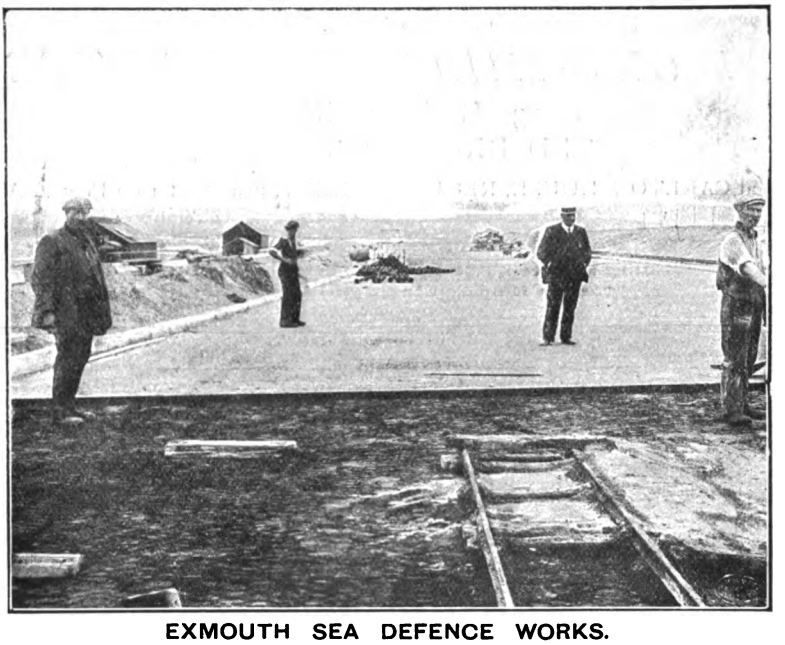

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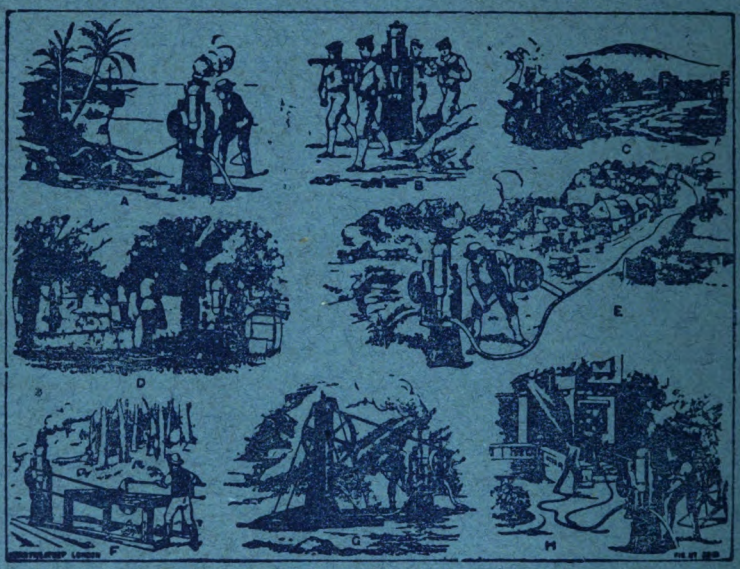

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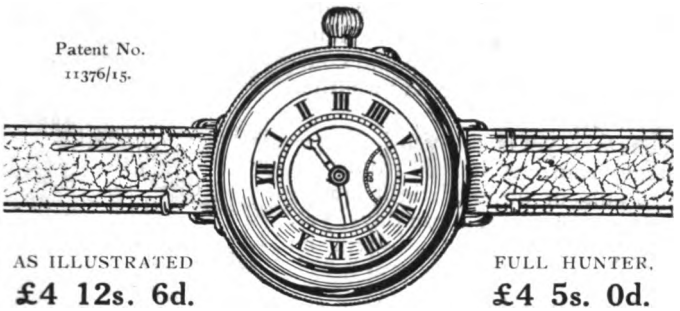

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COAGULANTS VERSUS SAND FILTERS AS AIDS TO WATER PURIFICATION IN THE FIELD.

By CAPT. H. S. BRIGGS, R.E., *and* CAPT. E. R. MARLE, R.A.M.C. (T.).

THIS Paper is an attempt to dispel the popular idea that filtration through sand is invariably necessary to the production of potable water. With this object in view, the usual methods of water treatment will be very briefly indicated, followed by a description, based on actual practice, of the "Alum precipitation—Chlorination process," or, more shortly, the "Alum Process."

The reduction of crude to potable water may involve :—

(*a*). Removal of suspended matter.
(*b*). Dealing with Bacteria injurious to the human system.
(*c*). Removal of Chemical poisons such as lead, arsenic, etc.

Processes designed for the removal of chemical poisons must be adapted to the particular agent to be eliminated, but are so rarely required that they will not be referred to in this paper. In general, therefore, processes must be provided whereby a clear water can be obtained from a muddy source, and injurious bacteria can be rendered innocuous.

"Purification" of water is usually understood to imply both the above processes, although it is not always realized that a perfectly clear water *may* be loaded with harmful bacteria, and conversely that a turbid water *may* be fit to drink. The means by which Purification, as thus defined, is effected are to a greater or less extent provided by Nature. When such natural processes are insufficient to produce water of the quality desired, the Water Engineer, by methods which are but imitations of natural processes, completes the work. The Table on next page gives the more important natural processes tending to purify water, and the corresponding methods adopted in Waterworks Engineering.

Direct Anti-Bacterial treatment by means of Chlorine or other Chemical agents on a large scale has not been to any great extent applied in England, though it is well understood in America. English practice relies almost entirely for Bacterial treatment on the action of the scum forming on the surface of the sand filter beds.

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Processes provided by Nature.	*Processes adopted by the Water Engineer.*
Sedimentation of suspended matter by prolonged standing in Lakes or large ponds.	*Sedimentation* of suspended matter in Tanks or Reservoirs constructed for the purpose. This process is sometimes hastened by means of a coagulant such as Alumino-Ferric.
Filtration through pervious strata.	*Filtration* through sand beds either under a small head of water in which case the rate of filtration is slow, or under a mechanically-produced pressure, when the rate of filtration is greatly increased. In both cases the sand bed is intended to act as a support for a layer of scum, which is in itself the effective filtering medium.
Oxidation of bacteria by sunshine, exposure to the atmosphere —such as occurs in the case of swift rivers or brooks—and the action of certain salts in contact with the water.	*Oxidation of bacteria* by agents such as Chlorine, Potassium permanganate, etc., exposure to sunlight in clear water reservoirs—and arrangements by which the water may be aerated.

The Alum Process.—In this process the water is treated as follows :—

(*a*). The suspended matter is precipitated by the addition of an Alum solution.

(*b*). The clear water is drawn off and harmful Bacteria are dealt with by Chlorination.

The following is a description of an installation embodying the Alum process which has now been at work for some months. The Waterworks in question are situated in Flanders on a river highly charged with organic matter, and also, especially after rain, with very finely divided clayey material partly of a colloidal nature.

The Waterworks originally comprised a large settling tank, gravel prefilters, sand filters of the ordinary pattern, and a clear water reservoir. As soon as the construction of the works was completed, it was evident that the amount of water demanded would be largely in excess of that allowed for by the original design. It was also found that owing to the large amount of suspended matter in the water the sand beds speedily became choked, if the water was passed through at any other than a very slow rate. The length of time required for the sand filters to become " ripe " was also a drawback. It was therefore decided to clear the water as much as possible before

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delivery to the sand beds by precipitating the suspended matter with Alum.

This process involves the addition of a solution of Alum (Commercial Alumino-Ferric) to the water to be treated. Provided that the alkalinity of the water be sufficient, the addition of Alum produces a white gelatinous precipitate of aluminium hydroxide, and this, mechanically, and by absorption, carries down with it not only the fine suspended matter, but also the colloidal matter, organic and inorganic.

The reactions taking place are probably as follows :—

1. Double decomposition between the soluble bicarbonates in the water and aluminium sulphate, giving soluble sulphates and aluminium carbonate.
2. Aluminium carbonate cannot exist in the presence of water and is immediately hydrolized giving aluminium hydroxide and carbon dioxide.

The former carries down the suspended matter mechanically, and the organic matter by absorption, while the latter remains in solution. The alkalinity of the treated water differs from that of the crude water by an amount agreeing with reaction (1).

Experiments of both a large and small scale having proved the efficacy of the process, four Alum Sedimentation tanks, each of some 40,000 gallons capacity, were constructed. These tanks were made by lining an excavation in the ground with Tarpaulins, and were found perfectly satisfactory. Arrangements were made whereby the crude water could be discharged as required, into either of the four Sedimentation tanks. The crude water discharge was led into a sloping wooden trough fixed at one side of each tank ; into this trough was taken a feed pipe conveying the Alum Solution, the flow of which could be regulated by means of a stopcock.

A connection from the clean water main from the main pump-house gave a supply of pressure water which was used for making up the Alum solution in the raised tank and also for flushing through the alum feed pipes when necessary. A hose connection for washing out the sedimentation tanks was also provided.

The outlets from the sedimentation tanks were fixed a few inches above the bottom of the tanks and floating intakes have since been added. The Alum treated water discharges were led to the original gravel prefilters, with connections to the clear water reservoir so that the gravel and sand filters could be cut out of the system if required.

The bottom of each of the Sedimentation tanks had a fall from the outlet end to a sump at the other end. When cleaning out was necessary the sludge was swilled down with a little water to the sump, and thence pumped out with a Merryweather to a drain.

The amount of alum used varied from $7\frac{1}{2}$ to 15 or even 20 grains

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per gallon. This large proportion, as compared with that used in civil practice, was rendered necessary both from the excessively foul character of the crude water and also from the necessity of reducing as much as possible the time of sedimentation. The amount of Alum required varied from time to time according to the turbidity of the water and atmospheric conditions. No precise rule could be found, and frequent experiment was therefore necessary.

The rule was stated some years ago (reference not at hand) that the quantity of alum to be used should be one half the chemical equivalent of the alkalinity of the water (expressed as $CaCO_3$). This, with most Flanders waters, is in the neighbourhood of 20 grains per gallon. In many cases, however, smaller quantities have been found quite satisfactory. The alkalinity of the water is an important factor in the process, and in cases where the alkalinity is below about 15 parts of $CaCO_3$ per 100,000 it is necessary to increase the alkalinity by adding a solution of lime to the crude water at the same time as the alum solution.

The Sedimentation process in the installation described above was eminently satisfactory. The suspended matter was deposited in from eight to twelve hours, leaving a perfectly clear supernatant water.

The Alum sedimentation was found to reduce the chlorine absorption in the subsequent chlorinating process, and the B.Coli content of the water was also to some extent reduced.

Water passed through the sand filters prior to the introduction of the alum process, although free from suspended matter, had a decidedly brownish appearance (the crude water was rich brown in colour), and an objectionable musty or earthy taste. These characteristics appear to be due to organic substances of the nature of the "Albuminoid Ammonias." If such a water be chlorinated according to the requirements of the "Horrocks" test, although it may be safe, it is very unpalatable, and tastes strongly of chlorine. This taste persists even if there be absolutely no free chlorine present, and a great deal of trouble has been experienced from this cause in the case of water filtered through sand. It is believed that the objectionable taste is due to the products of the reaction between the organic substances in the water and the chlorine—to chloramines.

The water passing from the sedimentation tanks possessed none of the objectionable characteristics just described. It was clear, colourless and its taste was good. Further, it could be efficiently chlorinated without a residual taste of chlorine remaining.

The alum-treated water, in the plant under consideration, was as a general rule passed through the sand beds to remove any solid matter that might have come over from the Alum tanks, but this procedure was for all practical purposes unnecessary, and in effect has frequently been dispensed with.

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The Alum tanks described have been working well for some months past, with an output which has on occasions reached 300,000 gallons per day.

The precautions necessary for the successful working of the Alum process may be summarized as follows :—

(1). The proper quantity of alum must be added in the form of a solution.

(2). A very thorough admixture of the alum solution with the water must be ensured. This admixture must be continuous and uniform during the filling of the sedimentation tank.

(3). The mixture of crude water and alum solution must be kept in motion during the filling of the tank. This can be done by causing the mixed water to enter and flow along one side of the tank with a certain degree of momentum.

(4). A warning must be given against confusion between the terms " Alumino Ferric " and " Iron Alum." Although the latter substance has a certain action as a coagulant, it is totally unfitted for the purpose. On one occasion a consignment of " Iron Alum " was in error supplied to the Waterworks described, and " Alumino Ferric " not being available, had to be used, but with disastrous results.

Alumino Ferric is the trade name of the substance which should be employed.

It must not be supposed from what has been said, that precipitation of the suspended matter by Alum is, in itself, sufficient for the production of a potable water. Whereas with the sand filter beds of civil waterworks practice, the removal of suspended matter and elimination of bacteria are effected at the same time, the Alum process can only and should only be relied on to produce a clear water from a muddy source—although in the process the B.Coli content is appreciably reduced.

Further treatment is necessary to deal with the Bacteria.

The best agent for the purpose is chlorine, introduced either as a gas or in the form of a solution of Calcium Hypochlorite (Bleaching powder).

Chlorine gas as an oxydizing agent appears to offer the following advantages over a solution of Bleaching powder :—

(*a*). A more delicate adjustment of quantities can be made.

(*b*). It is possible to add a larger excess of available Chlorine without the taste becoming pronounced.

(*c*). Successive samples of bleaching powder are found to vary in their available Chlorine content, whereas in the gas process pure Chlorine and nothing else is introduced.

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(*d*). The labour of making up the bleaching powder solution is avoided.

(*e*). Cylinders of liquid Chlorine are more conveniently handled than corresponding quantities of Bleaching powder and are less liable to deterioration.

The main difficulty in introducing the Chlorine into the water is one of accurately measuring the dose. There are several varieties of apparatus constructed for the purpose but even the best require an expert operator, are difficult to repair, and are extremely expensive. The system by which a Bleaching powder solution is introduced into the water to be chlorinated, will probably meet all requirements in the field. In whatever way the Chlorine is added, the admixture must be uniform and the Chlorine should be in contact with the water for at least 30 minutes before test samples are taken. The longer the Chlorine is in contact with the water before the latter is pumped into the mains the better, since there is thus less chance of an excess of Chlorine remaining to impart an objectionable taste to the water, and the very small quantities of Chlorine admissible only effect sterilization when the contact period is relatively long.

The following are in the writers' opinion, the advantages of the Alum process over Sand filtration plants, whether these be of the mechanical Filter type, the large open sand bed type of Civil practice, or the smaller quick filter of coarse sand such as have been installed in some instances.

1. *Economy of Labour in Construction.*—Alum Sedimentation tanks are easily made of excavations in the ground lined with tarpaulins. The bulk of this work is unskilled. Sand filters of the usual type must be made of brick or concrete and require an enormous amount of work in proportion to the results attained. Mechanical filters require special machinery and plant and a good deal of skilled labour in erection. Heavy and substantial foundations must be provided. Quick filters of coarse sand cannot deal efficiently with a really dirty water.

2. *Economy of Labour in Maintenance.*—All filters require a large amount of labour to be expended from time to time in cleaning the sand beds and washing and renewing the sand, compared with the labour in removing sludge from the Alum tanks.

3. *Economy in Wash Water.*—Alum sedimentation tanks require in proportion much less water for cleaning out than is required for washing the sand of sand filter beds, and dirty water can be used for the purpose if desired.

4. *Character of the Water Produced.*—As already stated, certain waters retain objectionable qualities even after passing through sand beds. Alum treatment will remove such characteristics.

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EFFICIENCY.

By ROBINSON SMITH.

[THE following article is reproduced from *The Quarterly Review*, No. 454, January, 1918, with the kind permission of Mr. Murray, Albemarle Street, and the Author.]

1. *Shop Management.* By F. Winslow Taylor. Harpers, 1911.
2. *The Principles of Scientific Management.* By F. Winslow Taylor. Harpers, 1911.
3. *Work, Wages and Profits.* By H. L. Gantt. New York: Engineering Magazine Co., 1913.
4. *Psychology and Industrial Efficiency.* By Hugo Münsterberg.
5. *Scientific Management.* By Clarence B. Thompson. Milford, 1914.

In taking their way westward, European habits and fashions follow what has been said to be the course of Empire. All the flotsam and jetsam of European life—Russian dancing, German scholarship, Hungarian musical comedy, Parisian fashions, and English literature—are borne on the tide and spread over the American continent. The American manufacturer is ever alert for the latest European inventions; the American scientist, whether he work in the laboratory or in the operating-room, is in touch with the literature of his speciality coming every month from abroad; and American scholars, reformers and preachers are alive to the latest discoveries in scholarship, the newest movements in social reform, and the most modern trend in religious ideas.

All this is as it should be; but what puzzles one is that the tide rarely sets the other way. It is only with the greatest difficulty and after many years that American books, customs, movements, reputations, arts, take root either in England or on the Continent. A few notable exceptions blind us to the truth of this fact. These exceptions are so pronounced, so American, that they create an impression of Europe's becoming Americanised quite rapidly enough; for, though perhaps excellent in themselves, they often are incidentally suggestive of those things in American life and ways that are distinctly alien to the European mind. The cinema has become an almost exclusively American enterprise; ninety-one per cent. of the films shown in the British Isles come from overseas. But

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this is an exception. Again, Americans, after forty years of insistence, have brought certain comforts, such as central heating, into European hotels, but how long and painful the process has been! And such reforms end at the hotels; the average English or French country-house, to say nothing of more modest dwellings, is still cold and uncomfortable in winter, at least for certain portions of the day and certain portions of the house.

This sluggishness of adoption is due to several reasons. It is due partly, as we have indicated, to a distinct liking for one's own way and a distrust of the ways of others; it is due partly to climatic conditions, which are so influential in forming the character of a race, and which in Northern Europe leave men deliberate and incurious, in Southern Europe emotional and easy-going; but it is also due very largely to the fact, merely psychological one might think, yet very real, that any idea coming to Europe from America must fight its way against a strong current that always sets the other way. Naturally, the European, from his superior historical position and his sense of what Europe has recently achieved in thought, art, and invention, finds this removal from American influences quite a natural if not beneficial detachment. Better fifty years of Europe than, if not a cycle, at least several hundred years of America.

And yet, while admitting the reasons for this imperviousness, while granting that it carries with it a certain protection against whatever is excessive in Western civilisation, one may doubt whether the balance does not represent a loss rather than a gain; the unprejudiced mind, conversant with both civilisations, may feel strongly that Europe would be a better Europe if she permitted herself more easily and quickly to be permeated by Western ideals and achievement. An entirely different social order exists there, an amazing activity in all departments of life; and it could not but give a wider and therefore a truer horizon to our own outlook upon life if Europeans were at least aware of this order and activity, even if these were found not quite fit to appropriate in their entirety. Again and again, on this side of the Atlantic, we are told that certain changes in the body politic and social are quite impossible, when the other side of the Atlantic has proved them quite possible years ago. Conditions differ, but, in general, society advances much more slowly than it might, simply because we are so ignorant of the advances made elsewhere. Content to say that human nature cannot be changed or that the British public would not put up with such and such a reform, it hangs back, rather proud of its conservatism. As a matter of fact, human nature is far more adaptable than we allow, and soon accommodates itself to new conditions, forgetting the old. And, essentially, in our reforms, it is not human nature that we wish to change; rather we are striving to effect certain benefits to society as a whole, let human nature remain or change as it will.

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The two forces in America that in recent years have done most to put the American house in order and of which next to nothing is known in Europe are Efficiency and Prohibition, both of which undoubtedly interfere with individual freedom, but have come into play in the States without any of that wholesale injustice with which we are always ready to brand any reform. Prohibition has disappointed its opponents, both in the facility with which it has been introduced and established, and in the number and magnitude of the blessings it has conferred. Totally unsuspected benefits have developed, including commercial benefits which have won over the most unbelieving adversaries.

But the question of prohibition is too controversial a matter to be discussed here and now. The subject to which I wish to call attention is the other movement, also widespread in the States—that of 'Efficiency,' or 'Scientific Management,' as it was termed by its founder. I prefer the simpler term 'Efficiency,' since I wish to treat of this force in its general, philosophic aspect, rather than in its application to industrial management. I speak of Efficiency as a force, since its discovery was precisely like the discovery of some hitherto unsuspected force in nature, in that it completely revolutionised old ways of doing things and opened up new fields of achievement. Efficiency was not unknown—it is, indeed, as old as the hills; but only toward the end of the last century, and in America, was it discovered that it could be applied scientifically to all walks of life, and particularly to the output of labour and the management of business. Some scoffed, and continue to scoff, at its (to them) exaggerated claims, pointing out that every big business must have studied Efficiency in its own particular line—it was, in fact, the very air that big businesses breathed. But the unprejudiced observer will, I think, confess that Efficiency or Scientific Management, as it has been preached and practised the last score of years in America, is a great and new idea in the world.

It developed in this way. In 1878 a young American, Frederick Winslow Taylor, whose training had been that of a pattern-maker and machinist, entered the machine-shop of a steel company at Midvale, Pennsylvania. He quickly rose from the position of a day-labourer to a clerkship; next he became a machinist running one of the lathes; then, after several months, as he turned out more work than other machinists on similar lathes, he was made 'gang-boss' over all the lathes. After about three years, during which time he had been promoted to be foreman of the machine-shop, it was found that the output of the machines had been materially increased, in many cases doubled. What was the secret of this increased output Taylor had scarcely told himself, much less the world, although he had his wild surmises, as do all those who make a

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real discovery. To obtain this result he had changed the movements of men and machines, and had adopted many new devices for speeding-up, probably to a greater degree than is usual where any increase of production takes place without increase of labour or plant; but as yet he had hit upon no new laws of maximum results, he had not converted his ideas into a science. He was confident, however, that scientific laws existed and could be translated into formulæ that would, with determinable modifications, be applicable for all work.

Taylor was now joined by others, as enthusiastic and convinced as himself; and in the years that followed, chiefly in the steel-works of Western Pennsylvania, countless experiments were carried out, countless data tabulated, as to the maximum amount of heavy labour that could reasonably be expected of a first-class man in a day—that is, how many foot-pounds of work a man best suited to a particular job could do. The number of foot-pounds varied considerably with the different kinds of heavy labour that were under inspection; in fact, it was soon discovered that there is no direct relation between the horse-power which a man exerts and the tiring effect of the work upon the man. On some kinds of work the man would be tired out when doing only one-eighth of a horse-power, while in others he would feel no greater fatigue after having done half a horse-power. After three long series of experiments, Taylor and his colleagues, by plotting the curves of their data, discovered the central law of heavy-labour maximum, namely, that to obtain the maximum output of a heavy labourer before he is tired out, he must be under load only for a percentage of the day. This percentage varies inversely with the strain caused by each given pull and push on the man's arms; the greater the strain, the smaller the percentage of the day that he should work, if the maximum result is to be obtained from his labour. Thus, when pig-iron is being handled, a first-class workman can be under load only 43 per cent. of the day when each pig weighs 92 pounds, but 58 per cent. of the day when each pig weighs 46 pounds.

Taylor got his data by timing men at work with a stop-watch. He experimented with them, noting which men did the most work, and why; seeing whether these men could do more work if they omitted certain movements or rested periodically; and timing the movements and output of these first-class men, so as to know just when these periods of rest should come and how long they should last. In the case of loading pig-iron on to a freight-car, Taylor's data pointed to the conclusion that a man suited to the job ought to be able to load between 47 and 48 tons per day, when the pigs weighed 92 pounds each. As one of the managers at the Bethlehem Steel Company, he then undertook to see whether his experimental data would hold good in practice and on a large scale. The pig-iron gang

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at these works at this time consisted of seventy-five men, who were lifting pig-iron from a ground-pile, walking up an inclined plank and dropping it into a car at the rate of 12½ long tons a day. Taylor's first step was to single out one of these men, a Dutchman called Schmidt, of the ox-type of man, and on this first day and all day long Schmidt was told by the man who stood over him with a watch : ' Now pick up a pig and walk ' ; ' Now sit down and rest,' and at half-past five in the afternoon Schmidt had loaded 47½ tons of pig-iron on to the car. It was then merely a question of picking out other men of the Schmidt type. Only eight were found in this particular gang, but enough of the ox-type were found either in the yard or outside ; and more suitable work was found for the sixty-seven men who were not the right men in the right place when loading pig-iron. By the end of the third year in which Taylor's methods had been applied at the Bethlehem Steel Company, the number of yard-labourers was reduced from between 600 and 400 to about 140 (of whom only two were drinking men), while the average number of tons handled was increased from 16 to 59 per man per day, the average daily wage raised from $1.15 to $1.88, and the average cost of handling a long ton lowered from 7⅓ cents to 3⅓ cents. In this reduced cost are included the office and tool-room expenses as required by the new system of management, and all the wages of labour-superintendents, foremen, clerks, time-study men, and others.

There is the whole story. It all points one way ; there is no other side to it. The men were better paid, happier, and soberer, and they worked fewer hours ; the Company increased the quantity and quality of its output at a reduced cost per unit, and experienced no labour troubles. In fact, wherever the Taylor system has been applied, there have been no strikes or labour troubles ; and the system has been applied to every form of industry and office management during a period of thirty-five years.

The illustration given above tells the whole story as regards increasing the production of man, but the science of efficiency has been applied with equally remarkable results to the production of machines. In one case, the gain in time made through running metal-cutting machines according to scientific principles ranged from two and a half times the speed in the lowest instance to nine times the speed in the highest. The new theory, however, meets perhaps with its greatest triumphs in those trades and occupations where the saving comes not alone from the observance of the laws of fatigue, nor alone from the speeding-up of the machines or contrivances involved, but thirdly and perhaps chiefly, from the imposition of system and order, and the proper relation of the workman to his tools. One of Taylor's followers, Mr. Frank B. Gilbreth, experimented with bricklaying, a trade thousands of years old, but one in which there has been little or no improvement in the imple-

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ments or materials used or in the method of their employment. Mr. Gilbreth, having made an intense study and analysis of each movement of the bricklayer, eliminated, one after another, all unnecessary movements, and substituted fast for slow movements. He studied the best height for the mortar-box and the brick-pile, and then designed an adjustable scaffold, with a table on it, upon which all of the materials were placed, so as to keep the bricks, the mortar, the man, and the wall in their proper relative positions. By this means the bricklayer is saved the exertion of stooping down to the level of his feet for each brick and each trowelful of mortar and then straightening up again. Under Mr. Gilbreth's system there is no need for the bricklayer to turn the brick over, or end to end, to examine it before laying, since the sorting is done by cheap labour on the ground, and the bricks, all good ones, have their best edge uppermost in the hod, which has its proper position on the adjustable scaffold. The mortar is mixed to such a consistency that there is no need for tapping the brick after it is in place. By these simple means the art of laying a brick was reduced from eighteen movements to five, and the capacity of skilful workmen raised from 120 bricks per man per hour to 350, attended, of course, by a very considerable increase in pay.

Another classic instance of this general type of increased efficiency was in the inspection of bicycle ball-bearings, in which, by eliminating the girls unsuited to the work, by resting the girls for ten minutes every hour and a half, and by other changes, thirty-five girls came to do the work formerly done by one hundred and twenty. The accuracy at the higher speed was two-thirds greater than at the lower speed; the girls' wages were increased by from 80 to 100 per cent.; and, in addition to the four periods of recreation during the day, their hours of labour were shortened from ten and a half to eight and a half hours.

It is instinctive to every man, and perhaps particularly to Englishmen, to look askance at innovations. They have a constitutional dislike of being jerked out of their ancient ways, and they protect themselves by advancing a host of objections. Thus Taylor's ideas met with a cold reception in this country. One argument advanced was that, after all, they did not make a new man of the labourer and did not solve our social and industrial problems. No one can read the history of the movement without seeing that, among other benefits, this is precisely what it does tend to achieve. Taylor's great hope from his new type of management was that it would largely eliminate the wage question as a source of dispute. 'What constitutes a fair day's work will be a question for scientific investigation, instead of a subject to be bargained and haggled over. Soldiering will cease to exist because the object for soldiering will no longer exist.' 'The close intimate cooperation, the constant personal contact between

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the two sides, will tend to diminish friction and discontent. It is difficult for two people whose interests are the same, and who work side by side in accomplishing the same object, all day long, to keep up a quarrel.'

Moreover, scientific management tends to solve our social problems, because it takes care of the individual. It is far from being merely a trick for dealing with men *en masse* for the sake of increased output. It does not lend itself to 'driving,' to pushing-through a piece of work at high speed regardless of the workman. As we have indicated, it not only finds out what work the individual can best perform, but it keeps the individual fit and happy in that work. With women-workers each is made to feel that she is the object of especial care and interest on the part of the management, and that, if anything goes wrong with her, she can always have a helper and teacher in the management to lean upon. One of the regulations is that all young women are to be given two consecutive days of rest (with pay) each month, to be taken whenever they choose. Still further, outside of the factory, all large undertakings in America now have Welfare Centres for their employees, with cost-price restaurants, club-rooms and recreation-grounds. Hartford, in Connecticut, practically guarantees all its skilled labourers continuous employment; the manufacturers, through their own labour bureau, notify one another a week in advance whom they are to lay off and whom they wish to take on.

There are no statistics to show the extent of the Taylor movement and what its total result has been. That result cannot be measured by figures, since efficiency is a spiritual force. Moreover, not all the manifestations of the new spirit owe their birth directly or indirectly to Taylor. It is a wide-spread, national movement. Although there is still much misgovernment and political corruption in the cities, efficiency is the great cry, in all parts of the land and in all departments of life. It may become nauseating where it is used merely to vaunt material wealth and the growth of 'big business,' but it is a welcome slogan if it means, as it should mean, that through efficiency the material things of life are to be made less material, are to consume less of our time and patience, are to sink to their proper place. The average wage of the members of the Typographical Union of New York City, including the periods when they are out of work, is over a pound a day of eight hours, whereas the average wage of compositors in London has been less than eight shillings a day of nine hours or over. According to the last report on comparative prices of H.M. Board of Trade, the cost of living in America is only 50 per cent. more than here.

The time has gone by when a nation can afford to neglect any proved reform, whatever its origin. England is forced to change and improve, whether she will or no, if she is to compete with other

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nations and bear the burden imposed by the war. The day of rule-of-thumb methods and dry-rot conditions must come to an end. Trade overleaps all prejudices and former hatreds, and follows where most money is made; and most money is made where there is the greatest efficiency.

Already the efficiency, *i.e.* the output, of the Canadian workman is appreciably higher than that of the English or Scottish workman; and the difference is bound to increase, ruinously for these Islands, unless there is a general awakening. Strips of moulding that cost 9*d.* each delivered from Germany before the war, still cost four shillings and sixpence made in England after three years of war. Those strips, and a host of other things, will climb any tariff wall that can be set up after the war, unless England is better organised. The sole protection, the sole preparedness, consists in a highly trained and intelligently educated democracy. Every English man, woman, and child must come to realize what efficiency means, and must insist with himself and all those with whom he comes in contact that it shall be attained. There is no walk in life, even as there is no action of our daily existence, where efficiency, both a general sense of it and its constant application, would not help to make both our own and the nation's task lighter and nobler. The man reading a story aloud to the cigar-rollers in a Cuban factory, the feat of washing the clothes of fifty thousand workers on the Panama canal over a period of seven years with scarcely the loss of a handkerchief, the stopping of trains 'at the crack' as is done in New York subways, the taking of order-tickets for Paris omnibuses in order to avoid disgraceful scrambling, the feeding of 25,000 people from one bread-depôt without crowding, as has been done for nearly three years in Belgium—these are instances of what can be done when some one man has a sense of causes and consequences.

One might think that a reform of this nature could be left to fight its own way, as a commercial reform, if the savings are as great as represented. It *has* made its way, and that rapidly, in the States; but the estranging sea lies between us, and here the cause of efficiency or scientific management needs preaching from the house-tops if it is to win attention. Taylor's books are more and more in demand, but as yet no school has been founded, as in America, to train efficiency superintendents, and neither the Government nor the Borough Councils have shown any anxiety to put the new idea into practice. The recently issued report (March 1917) of the special committee on munitions-output emphasises the need of Government action, showing how much might be saved if only the commonest laws of fatigue were observed. One factory, continually experimenting on its own initiative, has found its output distinctly larger when its operatives work five and a half days a week than when they work six or seven days a week.

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But we cannot wait for the manufacturers to adopt the better ways, and so gradually indoctrinate the people. It is for Government first of all to set the example; the public corporations should follow; lastly, the methods should be taught in the schools. There is nothing, from the opening of our mail in the morning to arranging for fresh air at night, in which a little extra care and thought will not avail. If we have not given it extra thought and care, we may be employing eight typists in our office when, if we listen to Taylor, five would do more and better work, and be better off themselves, while the other three would be really contributing something of sweetness and light to the general hive, where now they are no better than drones. 'Why labour at the dull mechanic oar,' why pile up burdens unnecessarily for ourselves and our children, when, almost by the turning of a hand and a little will, conditions can be made so much better? Let us talk less of the impossibility of changing human nature, let us study less the frequently meaningless will of the people, let us worry less about labour troubles and the relations between employer and employee. Let us, instead, aim at that greater all-round efficiency, by which alone wages can be safely increased and our labour problems solved. To the old virtues of industry and thrift, we need to add the new ones of scientific efficiency and daring change. We need a new spirit that forms and reforms, that leads and is not pushed; a new conscience, that will not let us rest until conditions are far better than they are. Incompetence, slackness, ignorant neglect, are the cause of half our woes. Let us be informed, let us be determined, and we shall not fail. The world is strong, very strong, but man is stronger.

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MEMOIRS.

COLONEL J. F. LEWIS.

BY the passing away, in February last, of Colonel James Frederick Lewis, the Corps lost one of its greatest authorities on fortification and one who was perhaps its greatest expert in the design and construction of all types of recent works of defence.

The founder of his branch of the family, James Lewis, who said he was a Welshman of Glamorganshire, was born about 1723 and went to Jamaica for some years, where he acquired the estate of Lewisburg; returning later, he lived near Bristol and died about 1790. He was a lawyer and so were many of his descendants, who retained their connection with the West Indies. One of them, also a James Lewis, was, at the request of the West India body in London, appointed one of the three Commissioners for paying off the 20 millions compensation voted on the abolition of slavery. He drew up the rules for the allotment of the money and himself paid away the Jamaica portion (£6,800,000). The father of the subject of this Memoir was the Rev. Philip Lewis, who was born on the 4th December, 1812, and was in the Eleven at Eton in 1830–31; he married Lucy, daughter of Hugh Myddelton Ellicombe, in 1845. He was the first Vicar of Bursledon, Hants, going there in 1850 and remaining till 1879, when he retired, owing to failing health, and died at Brighton on the 9th August, 1886, and was buried at Bursledon.

J. F. Lewis was born on the 14th May, 1846, at Culverlands Cottage, near Exeter, the residence of his grandfather, H. M. Ellicombe. Among his earliest recollections were seeing the Exhibition Building of 1851 being dismantled, the funeral of the Duke of Wellington on the 18th November, 1852, also going part of the way from Devonshire to Southampton by coach, the railway not having been made at that time. He first went to a small school at Titchfield, Hants, in 1855; after that, to various others and lastly to Mr. Wilson, of old Charlton, Kent, where he stayed till he passed for the Royal Military Academy, Woolwich, 4th on the list, at the summer examination of 1864.

After the usual 2½ years, he passed out 6th on the list, obtaining a commission in the R.E., dated the 15th January, 1867. He joined the R.E. Establishment—as it was then called—at Chatham, when

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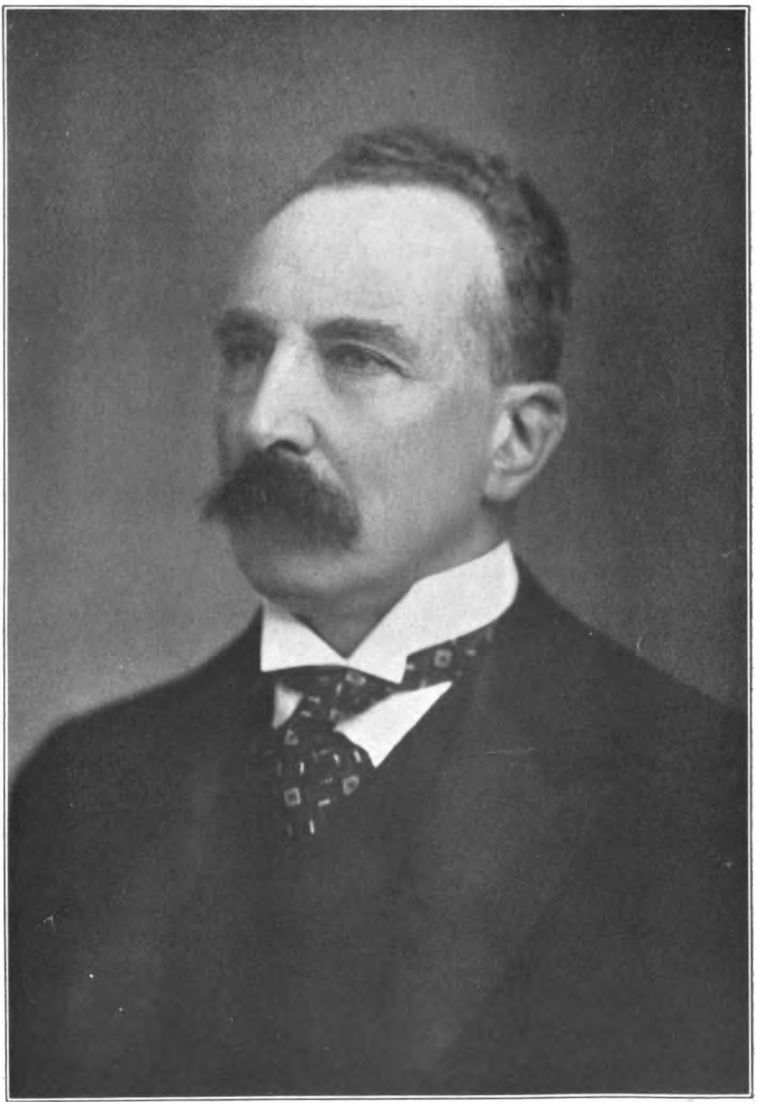

Colonel J. F. Lewis, R.E.

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Colonel Simmons was Commandant. After leaving the Establishment, he returned to Chatham for a time to finish the Catalogue of the R.E. Library there, which was published in 1871. During his time there, he was attached to the 10th Co., R.E., under the command of Major Pritchard.

On the 9th November, 1870, he was elected a member of the Geological Society of London; he had taken to geology with great enthusiasm, under the training of Mr. Green, of the Geological Survey.

In August, 1870, he went to Portsmouth, where he was attached to the 32nd Co., R.E., under Capt. Keith, and employed on alterations to the Battery in Southsea Castle and the Southsea Beach sea wall. On the 15th May, 1871, soon after the end of the Franco-Prussian War, when Paris was in a state of upheaval, he went on leave to France, and joined by Lieut. R. C. Hart, R.E., at Boulogne, proceeded to Versailles. Later he witnessed the batteries of both sides—the Communists in Paris and the Troops outside—pounding each other, and he came under fire, having some rather narrow escapes. On the 21st May, while looking through a telescope, he was unexpectedly the witness of the entry of some of the Troops into the Point du Jour, who had been admitted by some one inside. On the 22nd May, he and Hart suddenly came across men in R.E. uniform and found that Fraser, Noel, Chermside, Wilkinson, and his brother in the 40th, and two or three more had come over from Chatham and also Hart's brother Horatio.

They managed to enter Paris on the 26th May, being able to get about fairly well, seeing dead, wounded, prisoners, barricades, damaged buildings, etc. They were allowed to attend a court-martial—which they found to consist of one member only—during the four hours they were there about 150 persons were disposed of, only six being set at liberty. Only a preliminary sifting was made. The duty was done fairly on the whole, though quickly; it was found a very interesting experience. They made various unsuccessful attempts to leave Paris; but on the 3rd June they were permitted to do so; and, stopping the next day with Colonel Hart (R. C. Hart's father), at Boulogne, Lewis returned to England the following day.

On the 22nd July, 1871, Lewis left England for Malta, arriving there on the 3rd August, being posted to the 26th Co., R.E., under Capt. Hime; Colonel G. F. Mann being C.R.E.

He designed a fort for Tarxien Hill, which was approved, and a line of Works between the two harbours across Ta Samra Hill; on the completion of the latter, he set to work on fortification details for Tarxien, "thus acquiring," he records, "an amount of information that proved of immense value to him afterwards." Next winter

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was mainly occupied with fortification work on the new extended scheme for the defence of Malta. He drew up on his own account a report as to the Works to be built on the East of Valletta, which was sent home and the sites were adopted. In the summer of 1874, he was put in charge of the Works at Fort Benjemma, which he nearly completed before leaving the station. In 1874-75, he prepared a project for the complete fortification of the Nadur-Benjemma position, 8 miles across from sea to sea (which involved the preparation of over 60 plans). While at Malta, Lewis visited Constantinople and the Danube, Athens, Rome, and several of the large cities of Italy.

In May, 1875, Lieut. Lewis married Amelia, daughter of the late Edward Carey, M.D., of Guernsey.

Lewis returned to England and reported at the W.O. on the 1st July, 1876, where he was employed in the Fortification Branch under Major E. Harding Steward, Colonel Nugent being D.W.F. and General Sir Lintorn Simmons I.G.F. In March, 1878, he was sent to Edinburgh, on special duty, to design batteries for six 10-in. R.M.L. guns, for the defence of the Firth of Forth, which were afterwards constructed.

In February, 1879, he was appointed a member of the Machine Gun Committee just formed, which Committee eventually recommended the introduction of the Gardner gun. At the end of the same month, he was also appointed a member of the Committee on Working Heavy Guns and also of the Committee on Range Finders.

On the 31st March, 1881, all the Committees of the Director of Artillery were dissolved and a single Ordnance Committee appointed in their place. Capt. Lewis was appointed an Associate Member for the subjects of Machine Guns and Range Finders. In the spring of 1881, he gave a series of lectures on Permanent Fortification at the R.E. Institute, Chatham.

On the 11th April, 1883, Capt. Lewis left for Aden and India, for employment under the Indian Government on the design of the Defences of Aden. After three weeks at Aden, he went, *viâ* Bombay, to Simla, remaining there till the end of September, returning then, *viâ* Karachi, to Aden and thence to England, arriving on the 19th December, where he was employed under the India Office (but working at the W.O.), completing the designs for Aden. He worked under the Indian Government for about five years in all.

In February and March, 1884, Capt. Lewis again delivered a course of seven lectures on Permanent Fortification at the R.E. Institute, Chatham. On the 15th January, 1887, he was promoted Major, at the end of 20 years' service ; this was afterwards antedated to 11th December, 1886.

In November and December, 1888, Major Lewis, accompanied by

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Major Watkin, R.A., went to Gibraltar and Malta to choose sites for Position-Finding instruments, invented by the latter officer, returning *viâ* Italy.

During this winter, Major Lewis began to re-write the Text Book of Fortification, at the request of the I.G.F., General Sir L. Nicholson. This work, *Permanent Fortification for English Engineers*, came out in September, 1890, published by the R.E. Institute, and has been the approved authority on the subject ever since.

While working at the W.O., in addition to directing work regarding defence works and problems in many parts of the Empire, Lewis joined in drawing up a report on the defence of London and visited many parts of the United Kingdom, in connection with proposals for sites of batteries, etc., and experiments with the mounting and firing of guns and for Position-Finding instruments, etc.

He was promoted Lieut.-Colonel on the 22nd May, 1893, and in the following March joined at Portsmouth as C.R.E., Portsea Sub-District, in succession to Lieut.-Colonel A. de V. Brooke, Colonel Durnford being C.R.E., Southern District.

On the 24th June, 1896, Lieut.-Colonel Lewis left for the Island of Ascension, on behalf of the Admiralty, to design new batteries and overhaul engineering works generally; he went *viâ* St. Helena, and arrived there on the 16th July, remained till the 12th September, and reached England again on 28th September. Those who knew him will not be surprised to learn that when, later on, he saw Sir F. Richards, First Sea Lord, he "was very complimentary about the Ascension Reports." There is also an interesting entry as to having "arranged about disposal of turtle from Ascension with Gunter, of Berkeley Square"!

On the 26th October, 1896, Lieut.-Colonel Lewis handed over the duties of C.R.E., Portsea Sub-District, to Lieut.-Colonel Wilkinson, R.E., and on the 1st November again came under the Admiralty, being required to go to the Falkland Islands, for which he embarked at Liverpool, on the *Orcana* on the 5th November, Mr. Cole, of the Admiralty Office of Works Department, going with him. Among the places to which they went, and at most of which they landed were La Pallice, Corunna, Lisbon, Las Palmas, St. Vincent, Rio de Janeiro, Monte Video, Punta, Arenas, where they transhipped, and reached Port Stanley on the 10th December, where the Governor, Sir Roger Goldsworthy, kindly put them up during all their time on the Island.

Here their time was fully occupied preparing designs for a Naval Depôt, including pier, stores, dock, fortifications, barracks, etc. After coming through the tropics the weather must have been trying at times; of the 21st December it is recorded:—"*Longest* day. Temp. 49°!" But they worked with a will, and every assistance was readily given. The night before they left he says that the

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Governor proposed his health at dinner, and adds :—" He noted that we had been three months together and had not quarrelled ! "

They left on the 6th March, 1897, returning by the same route as they came. Reaching Monte Video on the afternoon of the 11th March, they were informed that a revolution was going on in the town, and that " the Government did not guarantee life after 8 p.m. ! " They were advised not to land till the morning, and they accordingly very wisely waited till the next day. On the 17th March they landed at Rio and went up the Corcovado, which is about 2,400 ft. high and nearly vertical, by a narrow-gauge railway, with central rack, winding up " through most beautiful tropic forest with flowering trees and shrubs and with distant views of wooded valleys and sea " ; he calls it " one of the most delightful trips " he had ever taken. He was evidently much struck by Rio ; on the way out, when entering, he calls it " one of the most lovely views on earth " ; but it was considered very unhealthy. Some years later, he was informed that many sanitary improvements had been made and he says that he was " glad to hear that the most beautiful place on earth has ceased to be the death trap that it used to be not long ago." They landed at Liverpool on the 4th April and he continued to work under the Admiralty until the end of the month.

He reported at the W.O. on the 1st May, 1897, and was put in charge of the Rifle Range Section of the Military Works Loan and became a Brevet Colonel, on the 22nd May, by seniority. During the winter of 1897–98, Colonel Lewis went to Switzerland with his family, spending two to three months there.

It was announced in Parliament on the 7th April, 1898, that Wei-hai-wei, in North China, was going to be taken over by Great Britain after being evacuated by Japan in the middle of May. Colonel Lewis was selected to go out and make a report on the proposed Defences. He accordingly embarked on the P. & O. s.s. *India* on the 3rd June ; with him there went Major Penrose, R.E., and Capt. W. A. Harrison, R.E., who were to carry out the survey of the newly-acquired land. They stopped at Gibraltar and Colonel Lewis went round the new Dockyard Extension Works, and, after giving a summary of what he saw, remarks : " It is an enormous work and a great deal is done." He little knew, presumably, that he would be stationed on the Rock before the end of the year. Of Malta, he says, " It seems almost unchanged," thinking probably chiefly of the years he was there as a subaltern. The ship called at Brindisi. He was, of course, much interested in the Defences of Aden and remarks on the Works being " delightfully invisible " and that he was " curious to notice how the details of the Forts had worked out." " Generally satisfactory," being the verdict ! At Colombo such a lover of nature was, like others going out to the East for the first time, much im-

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pressed by the tropical vegetation, the cocoa-nut palms, etc., the varied races of people and their dresses, the wonderful picturesqueness of the whole. They transhipped to the *Coromandel*, and called at Penang, where the Botanical Gardens in a beautiful valley with the waterfall at the head naturally attracted special notice, and then at Singapore, reaching Hong Kong on the 7th July, where they disembarked. He was met by his eldest son, then in the R.G.A., who was stationed there and had taken a room for him at the Hong Kong Hotel; Penrose and Harrison went to the R.E. Mess, where they all met at dinner that evening. He interviewed various local authorities, Major-General Black being in command and Colonel Elsdale the C.R.E.

On the 12th, they left in the s.s. *Kweiyang*, reaching Wei-hai-wei on the 19th, called on the Naval C.-in-C., Admiral Sir E. Seymour, and were assigned quarters in "Queen's House" (the old Yamen), where, with the kind assistance of the Navy and a "No. 1 Boy," who was an old R.N. Steward, they soon made themselves comfortable. One of the first things in connection with the Survey was, of course, the measurement of a Base, and he records the purchase of the site of one end for the Government for $8 and of having "paid cash down to the great delight of the whole village!" Major F. M. Close, R.A., came up from Hong Kong and they worked on the proposals for the Defences, and went together to Peking to report to the British Minister, Sir Claude MacDonald, leaving Wei-hai-wei in the s.s. *Liensking* on the 23rd August, by Chefoo, past the Taku Forts, part of the way up the river, and thence, by rail, through Tientsin, to Peking, which was reached on the 25th. They called at the British Legation the next day, saw the Minister and showed him a summary of the proposals.

While there, they visited some of the principal buildings, etc., but the state of the roads, the mud, ruts and filth impressed themselves upon him most forcibly; on arrival they went from the station to their hotel "packed each into a sort of ekka" and found it so bad that he says "The drive into Peking is unforgettable and indescribble. No lady should take it!" When leaving they went on donkeys, which they found "much better!" But this was in "the good old days" before the Siege of the Legations; since then, things have much improved, and, although there are plenty of ruts and much mud in many of the roads, the railway terminus has been brought inside the city and all the area of the Foreign Legations has been cleared, and is well kept.

They left Peking on the 29th August, returning by the same route as they had come; Close left Colonel Lewis at Chefoo, on his return to Hong Kong, and the latter went thence to Wei-hai-wei in H.M. T.B.D. *Whiting*, arriving on the 2nd September. Then he busied

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himself in making designs, plans, etc., and finally left on the 16th September in the *Higo Maru*, going by Chemulpo and Fusan to Nagasaki, Moji and through the Inland Sea to Kobe, landing there and visiting Kyoto and Osaka. At the latter when visiting the Castle, for which special permission was obtained, he says :—" One of the sentries called my attention to the fact that my trousers were turned up ! " Going back to Kobe, he left on the 28th September for Yokohama, arriving the next day ; landed, paid a visit to Tokyo, came back to Yokohama, went for the day to Kamakura, and embarked on the C.P.R. s.s. *Empress of Japan* on the 7th October, having seen Fuji—" a wonderful cone "—both with and without snow on it.

He reached Vancouver on the 18th October, and Victoria the same day and visited Esquimault ; went across by Montreal and Quebec to Halifax, where he saw the G.O.C. and also various R.E. officers and, as was his wont, visited batteries, etc., left on the 3rd November and reached London on the 15th and, in due course, reported himself and handed in his report.

Colonel Lewis was made a Substantive Colonel on the 22nd December, 1898; and on that day embarked at Southampton on the hired transport *Jelunga*, with his wife and two daughters, to become C.R.E. and Colonel on the Staff at Gibraltar, relieving Colonel Rathborne ; they arrived there on the 27th. General Sir Robert Biddulph was the Governor, Lieut.-Colonel E. J. Dewing was O.C. Cos., R.E., and C.R.E., North Sub-District, and Lieut.-Colonel J. E. Blackburn, C.R.E., South Sub-District ; after some time, the former was relieved by Lieut-Colonel Middlemass, but the latter remained until within a few weeks of Colonel Lewis's departure. His predecessor was appointed by the Governor Chairman of the Sanitary Commissioners, a civil body which is responsible for the duties usually carried out at home by municipal authorities, and Colonel Lewis succeeded him in those duties also, an arrangement which had very good practical results.

The various problems, especially in connection with defence, which arose in a first-class Fortress, like Gibraltar, were such as suited the particular experience Colonel Lewis had during his Service. The big Dockyard Extension, to which allusion has already been made, was carried on and nearly completed in his time, modifying to some extent the conditions of defence, etc. The Boer War took place during his time ; two of the four companies, R.E., went to S. Africa, being replaced, after an interval, by two others, and the Infantry Garrison was changed more than once. After the War, General Sir George White relieved Sir R. Biddulph, as Governor, and during his time the Duke and Duchess of Cornwall and York visited the Rock, the first stopping place in their tour of the Empire ; and

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at Easter time, in April, 1903, King Edward VII. also paid a visit to Gibraltar, where Colonel Lewis accompanied him to O'Hara's Battery, on the S. end of the Ridge, where he spoke about the Defences.

During his tenure of office at Gibraltar Colonel Lewis was called home to advise the Colonial Office regarding the future government of Wei-hai-wei. On the 4th May, 1903, he left the Rock, having handed over to Colonel Wilkinson, reached England on the 9th, went on half-pay on the 10th and retired on the 14th, under the age clause.

Like many retired officers, Colonel Lewis found a difficulty in deciding where to settle; towards the end of 1904, he and his family went to Winchester and finally made up their minds to stay there; not being able to get a suitable house, but finding a desirable site in Christchurch Road, he built one there, calling it Myddelton, after one of his ancestors, Sir Hugh Myddelton, and they moved into the house on the 9th December, 1905.

On the 15th December, 1904, he started for Hong Kong, on a special mission to adjust a land dispute there, between the W.O. and the Colonial Authorities. He went through France and caught the P. & O. s.s. *Britannia*, at Marseilles, the next day; transhipped to the s.s. *Simla*, at Colombo, on the 1st January, 1905; at Singapore, he was entertained by Major-General Sir Arthur Dorward, and reached Hong Kong, on the 14th January, and was invited by Sir Matthew Nathan to stay with him, at Government House. The G.O.C. was Major-General V. Hatton. Colonel Darling had arrived recently to take over the duties of C.R.E. from Colonel L. F. Brown, who was retained to go into the land question.

Colonel Lewis went into the matter and his report was agreed to by both parties; the "Lewis Agreement" being still referred to when questions arise. In addition he made a report on the Defences. While there, he went with the Governor for a short trip to the New Territory (a portion of the adjacent mainland leased from China), and also paid a visit to Canton.

He got instructions by cable to report on the Defences of Port Arthur, which had just been taken from the Russians by the Japanese, and to first report himself personally to the British Minister, at Tokyo; this last pleased him much, and he left Hong Kong on the 8th March, in the C.P.R. s.s. *Empress of Japan*, reaching Tokyo on the 16th, where he saw the British Minister, Sir C. MacDonald, and also met Capt. Sir A. Bannerman, R.E., who had recently come from Port Arthur. There was much rejoicing at Tokyo at the time, the Battle of Mukden having just been gained by the Japanese.

After communication with the Japanese authorities, permission was granted for Colonel Lewis to go to Port Arthur, accompanied

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by Bannerman, and they went, on the 2nd April, by rail to Shimonoseki and there embarked on the *Aki-Maru*, which was being used as a transport, reaching Dalny (now called Dairen by the Japanese), on the 8th and going by rail to Port Arthur the next day. Here they were assigned a little one-storeyed wooden house which was that used by General Kondrachenko, the Engineer hero of the siege; everything was very plain as he left it. Later they were moved into the house which had belonged to General Bailui, the Russian Artillery Commander, which was more comfortable. General Ijichi, who was in command, gave them full facilities for visiting the various parts of the Fortress and taking photographs.

They left Port Arthur on the 19th April, returning to Shimonoseki whence Bannerman went back to Tokyo and Colonel Lewis left, on the 23rd, in the s.s. *Anhui, viâ* Nagasaki, for Shanghai, where he transhipped to the French s.s. *Armand Béhic*, reaching Hong Kong on the 1st May, where he related his experiences of Port Arthur, and left in the P. & O. s.s. *Coromandel*, on the 6th. The Captain took the ship near the coast of Cochin China to try and sight the Russian Fleet; in this they were successful, as, on the 8th May, they passed some guardships, evidently on the look-out, and, later on, saw the Fleet at anchor, in Vanfong Bay! Colonel Lewis changed into the P. & O. s.s. *Victoria* at Colombo, disembarked at Marseilles and reached England on the 5th June, 1905.

He records that "this was a most interesting trip" and his appreciation at being chosen for the work as "a compliment to a retired officer."

He was, as might be expected, much in request for information regarding Port Arthur and, on the 13th July, he lectured to officers of the War Office, at the R.U.S. Institution; on the 20th, at the R.E. Institute, Chatham; and, on the 26th September, at the R.M.A., Woolwich; and again on the 15th March, 1906, to the officers at Portsmouth.

In 1910, Colonel Lewis went for a trip to the West Indies, starting from Southampton, on the 2nd February, in the R.M.S.P. s.s. *Tagus*, on board he found Colonel and Mrs. Rochfort-Boyd. He called at Barbados, Grenada, and other places, finally reaching Jamaica.

Shortly after his return from the trip, he sent in a Report on the Defence of the Panama Canal to the W.O. and received the thanks of the Chief of the Imperial General Staff for his "valuable and interesting report."

On 14th May, 1911, his 65th birthday, Colonel Lewis received an offer from the Coventry Ordnance Works, Ltd., to act as adviser to the Firm for Foreign Governments requiring designs for batteries; this offer he accepted; the work lasted for a year.

While at Winchester he was by no means idle, but assisted

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various organizations connected with the Church and schools, and in philanthropic work. He represented the Church Schools on the City Education Committee for some years. When a Church Institute was opened in one of the local Camps he assisted those responsible for its management. He was for some years on the Committee of the Church of England Soldiers' and Sailors' Institutes Association, in London. Although living at Winchester, he joined the local Committee of "The Trafalgar" Church of England Institute at Portsmouth, helping in its reconstruction and becoming Vice-Chairman and Chairman of the House Committee; when he resigned these positions, the Committee named one of the "cabins" after him, placing an inscription on the door.

Colonel Lewis was a member of the R.E. Institute Council at his death, having held office for the allotted periods from time to time. He was also for years a member of the R.E. Institute Publications Committee.

Colonel Lewis had three sons and three daughters; he is survived by Mrs. Lewis, two sons and two daughters, the eldest girl died in infancy. The three sons all married, and it is interesting to note that though Colonel Lewis would have been the last of his family had he been without children, he has now left 10 grandsons, and, therefore, deserves well of his country at this crisis!

When the War broke out in 1914, Colonel Lewis offered his services to the W.D., to enable a younger man to go to the Front; but, owing to his age, his offer was not accepted. But he has been well represented by his sons, all of whom made the Army their profession; the eldest was for a time on the Staff of one of the Divisions in France, and for the rest of the time at the W.O.; the second is serving in France; and the third made "the supreme sacrifice" in France, in October, 1914.

Colonel Lewis was always fond of taking plenty of walking exercise, but towards the end he had to be careful; he records:—"I was told that the mitral valve of my heart had more than it could do and that I must go easy in future," and he frequently found that his energies had to be curbed, and although near the end he made some surprising rallies he finally succumbed to heart failure on the 7th February, 1918, at his house, at Winchester. He was buried in Compton Churchyard, near Winchester, on the 12th February.

Colonel Lewis will be greatly missed by all who knew him; in his domestic relationships, he was not to be surpassed; as a friend, always staunch and true; it is impossible to think that he could ever make an enemy, being always full of consideration for others, ever ready to help any one, he did much to assist those in need in an unobtrusive manner, ever prepared to expend himself. He was very fond of travelling and studying nature and took a great interest in

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botany, geology and architecture. He was much liked by all the officers serving under him, being just as courteous in his dealings with a subaltern as with a senior officer.

It seems strange that one who was so frequently selected for special services, which he carried out so satisfactorily, should have received so little special recognition ; but this may perhaps partly be attributed to his retiring disposition and his dislike to advancing his personal interests.

He was of a strongly religious character and, as was said recently of an officer who fell in France :—" He was a real noble and Christian English gentleman, than which no more can be said of any one."

C.W.R.ST.J.

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COLONEL G. F. O. BOUGHEY, C.S.I., R.E.

COLONEL BOUGHEY received his commission in the Royal Engineers in June, 1862. After the usual training at Chatham he arrived in India on January 5th, 1865, and spent the whole of his service there. He served in the Bhootan Expedition, 1865–6 (Medal and Clasp). In 1869 he joined the Public Works Department as Assistant Engineer, Railway Branch, North-West Provinces, was appointed Executive Engineer, Rajputana Railway, in September, 1870, Deputy Consulting Engineer for Guaranteed Railways, Lucknow, in May, 1877, and Assistant Secretary, Railway Branch, North-West Provinces and Oude, in 1879. He saw service again in the Afghan War, 1878–80 (Medal). He was appointed Manager of the Indus Valley and Kandahar Railway in January, 1882, and Manager of the Eastern Bengal State Railway in November, 1885. He took charge of this latter line at a critical time, a year after it had been acquired by the State, and neither the Calcutta public nor the late Company's staff welcomed the change with enthusiasm. The task of consolidating and amplifying the necessary alterations in procedure and working was no easy one and there were many difficulties to be overcome, but the new Manager soon earned the confidence and respect of the commercial public of Calcutta and the regard of his subordinates.

He was the first in recent years to put forward the project of a bridge over the Ganges at Sara and took great interest in the scheme in the late eighties. In the spring of 1891 he induced Sir John Fowler, the eminent engineer, to visit Sara, and consider the question of the suitability of a bridge or a tunnel to make the necessary connection. The project remained for a long time pigeon-holed amongst the records of the Government of India, but Colonel Boughey lived to see the completion of the bridge.

Colonel Boughey became Manager of the North-Western Railway in October, 1892, and his house at Lahore became a centre at which all his staff could look for a hospitable welcome from himself and Mrs. Boughey, while his personal interest in each individual and his appreciation of honest work had far-reaching effects on the future of the many assistants who had the privilege of serving with him. He was appointed Honorary A.D.C. to the Viceroy for valuable services in connection with the Volunteer Movement in India, and was mentioned in the Commander-in-Chief's despatches of the Chitral Expedition, 1895, and was rewarded with the C.S.I. in January, 1896.

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Colonel Boughey was a man of strong character and varied experience, with a sound knowledge of Railway Engineering and a very complete grasp of the economics of Railway Administration. He had a strong belief in his own opinion, but the results generally proved that his confidence was not misplaced, and his disinterestedness and lack of self-seeking were never open to question; all who worked with him had great faith in him and felt that their interests were safe in his hands.

Colonel Boughey returned home in 1896, and held the appointment of Light Railways Commissioner in England from that year till the end of 1917.

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NOTICE OF MAGAZINE.

REVUE MILITAIRE SUISSE.

No. 2.—February, 1918.

THE PRESENT SITUATION RELATING TO OUR INFANTRY MACHINE GUNNERS.

I. *Organization.*—The author of the original article states that the organization of the 120 companies of machine gunners which the Swiss Infantry have had to provide since the summer of 1915 has been completed and that the *personnel* of these companies finished their preliminary course of instruction on the 24th November, 1917. The introduction of a machine-gun organization in the *landwehr* similar to that provided for the *élite*, namely, one M.-G. company per battalion of every regiment, has yet to be carried out to complete the full scheme which has been projected.

Attention is called to an article by Colonel Egli, which appeared in the *Basler Nachrichten* for the 24th November, 1917, entitled *On the German Front in Flanders, III. New Infantry Formations*, in which it is stated, *inter alia*, that "Progress in the employment of machine-guns keeps pace with that effected in the technique of hand grenades. The weight of the machine-guns militating as it did against its mobility, the large numbers of the *personnel* composing the gun detachment and the size of the teams were all obstacles to the efficient employment of this arm. The adoption, however, of a lighter gun has solved the difficulties referred to; and the provision of a simpler mounting for the gun has now made it possible for one man to transport the gun and its mounting. The other numbers of the detachment carry the ammunition and help in manning the gun. The light machine-gun is not the same weapon as the automatic rifle with which it must not be confounded; the former is practically the ordinary Maxim gun, that is to say, it is provided, as is the Maxim gun, with a water-cooling jacket. On the other hand, the mounting is different, as it is fired from the shoulder by the gunlayer. The light machine-gun is less rigidly fixed on its present mounting than has been the case with the mountings hitherto in use; in consequence, a wider angle of dispersion can be obtained. This consideration, however, is not of very great importance in the case of the short ranges involved in trench warfare. To-day, every German infantry company is provided with several light machine-guns. In addition, the numbers of machine-guns of the heavy model with the battalions and regiments have been very considerably increased, so that the troops employed on the front held by a regiment are able to sweep the field before them with a dense band of bullets, even where all the machine-guns are not simultaneously brought into action and even if several of these guns are knocked out."

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The author of the original article is of opinion that the Swiss Army should not be provided with two types of machine-guns, a heavy and a light one. In a small army great care requires to be exercised to avoid multiplicity in the types of the armament parts, since this not only creates difficulties as regards manufacture but also brings about complications in connection with the training of specialists. It is stated that the machine-gun now in possession of the Swiss Army is not too cumbersome but exactly meets the requirements of the situation. The same, however, cannot be said of the mounting for the Swiss machine-gun. The Swiss tripod mounting, although much lighter than the German heavy tripod, is not considered suitable for universal use. It does not lend itself to the requirements of trench warfare. The most cannot be made of the protection of the parapet; considerable time is required to get the tripod into position. And if the weight of a shield —the adoption of which is imminent—be taken into account, the total weight involved will be quite equal to that of the German heavy machine-gun. Under these circumstances, the author of the *Revue* article is of opinion that whereas the Swiss Army should possess but *a single type of machine-gun*, it should be provided with *two types of mountings*: one for long-range fighting and the other for short-range combats.

In the case of long-range fighting a machine-gun requires telescopic sights, a tripod mounting and a shield. In the case of short-range combats, telescopic sights and the tripod mounting must be dispensed with and the shield should be so constructed as to provide a support for the gun. In the latter case a greater dispersion of fire can be obtained than where tripod mountings are in use; this is all to the good. The principal consideration, to be borne in mind, however, is that the ground, within a certain range, over which the enemy has to advance must be capable of being brought under fire up to the full height of a man.

In the case of a further increase in the number of machine-guns in the Swiss Army questions relating to the possibilities of recruiting the additional *personnel* for manning these guns and of providing the necessary transport, including animals, call for attention. It is said that so far as the Swiss infantry is concerned no difficulty is apprehended. Experiments have proved that the Swiss mountain wagons are capable of transporting eight machine guns, together with their tripods and shields and also the ammunition for immediate use. If, therefore, in addition to the guns with the machine-gun companies—intended principally for long-range fighting—each company of an infantry battalion were later to be equipped with eight machine-guns apiece for short-range combats, four 4-horse mountain wagons and four 1-horse carts would be sufficient for the transport of the 32 machine-guns of a battalion, including their ammunition and all accessories.

So far as the transport question is concerned the foregoing proposal does not exhaust all the possibilities. By a trifling alteration in the machine-gun cart now in use in Switzerland, it can be adapted for the transport of two guns, with their tripods and shields, instead of one only. On good roads and for short distances arrangements can also be made to carry a small quantity of ammunition.

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In difficult country and in proximity to the enemy, when the carts can no longer be used, the gun and its tripod and shield must be carried by the gun detachment, and similar arrangements must naturally be made for the transport of the ammunition.

In the event of an increase of machine-guns, by the issue of these weapons to infantry companies, it is recommended that an increase of armourers should take place, so that each infantry company may have two men specially skilled in the repair of machine-guns. Further, each section of an infantry company should have two N.C.O.'s and eight men trained in handling a machine-gun in short-range fighting—a month's instruction it is suggested would be quite sufficient for the purpose.

II. *Training.*—The author of the original article justly remarks: Organization and *matériel* provide in themselves alone an insufficient preparation for war. There is required in addition sufficient military training and the development of a tactical instinct in troops to fit them for the realities of a soldier's calling. The opinion is expressed that sufficient progress has not been made in the training of the machine-gun *personnel* of the Swiss Army.

Attention is called to the issue of the *Allgemeine Militär Zeitung* of 24th November, 1917, in which an article entitled *Beiträge zur Gefechtausbildung der M.G.* (Points in connection with the battle training of machine-gunners) by H.C. Capt. Herbert Constant, a Professor at the Swiss School of Musketry, is thought to be the author of the article referred to; the views expressed therein meet with hearty approval, the suggestion being made that every infantry machine-gun officer should make a thorough study of H.C.'s article and apply the lessons contained therein.

The rules laid down relating to the fire of several machine guns against a single target and in the preparatory stages of an engagement deserve the closest attention. The opinion is expressed that the training of Swiss machine-gunners in the matter of fire discipline is based too rigidly on the teachings of the Artillery School and not sufficiently on that of the Cavalry School. There appears to be a tendency to attempt to treat machine-guns as if they formed units of a battery of artillery. It is pointed out that a control of this nature is not possible and not desirable in the case of machine-guns. Another fault in the handling of this arm, which has been noticed, is the attempt to bunch the guns on an exceedingly narrow front—the Swiss provisional regulations lay down that machine-guns when in action shall be spaced about 30 paces apart—and to have too many men in the immediate vicinity of the weapon.

Where machine-guns are served by two men and are properly brought into action in masked positions, it will rarely be necessary for them to open fire at a longer range than 600 yards.

Range practice with machine-guns should, it is urged, always be carried out as a tactical exercise. The method of forwarding ammunition to machine-guns as at present practised in Switzerland is said to be faulty, as it tends to cause damage to the ammunition. It is recommended that a small ammunition dump should be formed in rear of each section of machine-guns and the ammunition passed carefully forward thence.

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The object to be aimed at in the training of machine-gun detachments should be to develop the initiative of every individual member so that he may be able to carry out his duties and to act independently without spoon feeding on the part of the Section Commander. Naturally, everything should be done to create *esprit de corps* of the proper kind in machine gunners; every man should be encouraged to aim at being able to handle his gun without assistance. Machine-gun officers should never forget that they belong to the infantry arm and that it is in that arm that they must seek their career.

The original article is illustrated with a number of photographic reproductions showing machine-guns in action under various conditions.

THE ITALO-AUSTRIAN THEATRE OF OPERATIONS (*continued*).

The text of the original article is accompanied by a sketch-map showing the lines of advance from Austria into Italy. In preceding articles on the above subject the operations of the Italian Army, which brought Cadorna's troops to within a few thousands of yards of one of the objectives of the War, Trieste, have been briefly described. It would be premature to discuss, at the present time, the causes which led to the Italian retreat from the Isonzo. History will, no doubt, deal with this point as well as with the reasons which have made it impossible for the Austrians to hold the Italians in check without German assistance. One fact, however, clearly stands out, namely, that the fighting efficiency of an army cannot be kept at concert pitch without the *moral support of the whole nation* to which it belongs. Without this support an army suffers in its fibre as well as in its discipline.

Cadorna's was a two-fold task: that of directing military operations, whilst at the same time countering the intrigues of those opposed to the War, a war held by Italian patriots to be the crowning effort in a national work begun half a century ago.

The *Revue* article deals with the difficulties of the military operations connected with the Italian retreat and the possibilities connected with an Italian offensive after the Austro-Germans had broken their front.

The Italians had for some time recognized the importance of the Isonzo front, and the necessity of providing the maximum artillery force and other troops on that front had been urged from time to time. Their victories on the Isonzo had caused a heavy drain on their resources. It was realized that there were weak points on the Isonzo front, and that if the enemy succeeded in piercing it at one of these points a dangerous situation was likely to arise, owing particularly to the mountainous character of this region.

The importance which the Italians attached to this front is indicated in the following extract from an article which appeared in the *Esercito italiano* of the 6th September, 1917:—"We must always bear in mind that the *decisive front* of the War, the *front of victory*, is that one on which the Entente are able, within the shortest possible time, to bring the Central Powers to terms promising a permanent peace. This front is still to-day the Italo-Austrian front, where our Army has been able, thanks to its enormous sacrifices, to inflict a real and great defeat on the hereditary enemy."

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In an Austro-German offensive against Italy an attempt, it may be accepted, would naturally be made by the Central Powers to advance by several routes converging towards the same point on Italian soil, railways being utilized to as great an extent as possible and care being taken not to trust to this means of transport at those altitudes at which their use might be problematic at certain seasons of the year.

An inspection of a map shows that the lines of advance *viâ* the Stelvio, Tonale and Judicaria Passes, and the Adige from the Tyrol into Lombardy form divergent routes; these routes can be easily defended on the Italian side of the frontier. Valtellina, Brescia and Verona constitute strong centres of manœuvre where invading columns could with ease be held up and checked. It is for this reason that the Austrians have made no attempt to advance in this region in the present War.

The other routes into Italy form two groups; one converging on Padua, the other on Udine. The first group consists of the roads *viâ* the Fugazza, Sugana, and Cadora Passes. They present the disadvantage that, if used, long marches in the mountains are involved and, further, that no railways are near at hand. The second group consists of the Tarvis-Pontafel-Udine and the Tarvis-Caporetto-Cividale-Udine roads; these roads form the most advantageous lines of invasion for the Central Powers, affording as they do the most ready means of access between Austria and the plains of Venetia and the use of the most direct railway. A subsidiary advantage in connection with the use of the roads of the second group lies in the fact that a simultaneous use can be made by the Austrians of the routes from the Carniola *viâ* Tolmino and Gorizia and from Trieste along the coast.

It is evident then that in the event of the Italian front being pierced in the upper reaches of the Tagliamento, the Carso front becomes untenable by them. Further, the situation is such that owing to the paucity in the number of roads remaining available and the obstacle of the Isonzo in rear of the Italian positions an offensive stroke for the purpose of re-establishing their front becomes, under the circumstances, an extremely hazardous, if not impossible, operation.

The Italian front being so pierced Palmanova loses its value; the Tagliamento is itself too vulnerable and the bridgeheads at Sacile and Motta, on the Livenza, can then serve merely as points to be held by rear-guards to cover the Italian retreat.

The real menace to Austrian columns invading Italy in this region lies in the possibility of a flank attack from the sea, S. of the Piave.

The mountain region about the Cadora affords excellent protection on the Italian left flank.

In the operations now in progress on the Italian frontier, the Tyrol is once more playing a preponderating *rôle;* its configuration renders it eminently suitable for defensive warfare. The nature of the country is such as to preclude all possibility of a surprise of any kind.

The most easterly point of access between the Tyrol and the Cadora is *viâ* the M. Croce Pass (about 5,355 ft.), leading to the upper Tagliamento; further west lies the main Landro road giving access to Belluna. An offensive which succeeds in giving a belligerent possession of these two roads not only places the Cadora in his grasp but also one of the lines of

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advance on the front Conegliano-Bassano, whence routes converge on Treviso and Padua. In the event of a successful invasion *viâ* the Sugana Pass taking place in combination with one *viâ* the Landro road, the invader of Italy secures the very important line Trent-Feltre-Belluno. For this reason the road *viâ* the Sugana Pass possesses special interest.

There are many positions along the route through the Seven Communes which can easily be prepared for defence by the Italians, such for example as that at the Val d'Arsa, where the Austrian attacks were so heroically met and driven off in 1916. The culminating point on this route is the Fugazza Col (4,590 ft.), and barely 30 miles of the route lies in mountainous country. It connects Vicenza and Rovereto by almost a straight line and possesses the great advantage for an invader that it skirts the plains of Padua and turns the entrenched Camp of Verona. Nevertheless, the defenders, by holding the line M. Lessini-Lake Garda, place themselves in a position from which a counter-thrust can be delivered with some possibility of success.

The line of the Adige, from Rovereto to Castelnuovo, forms a long defile hemmed in on the E. by the Monts Lessini and on the W. by M. Baldo and Lake Garda. This configuration lends itself to the creation of defensive positions, specially in view of the fact that the Adige, which is from 65 to 90 yards wide, can only be crossed at few points on this part of its course. South of M. Baldo, the Rivoli plateau affords further opportunities for barring the approaches *viâ* the Adige to Verona and Mantua. Napoleon considered the Rivoli plateau the key position in this region.

The Judicaria Pass line of advance from Trent to Brescia is not so much hemmed in as the Adige route between Mori and Rivoli. Its narrowest part is at Lake Idro, where it contracts to a width of about six miles, being barred by the fortifications of Rocca D'Anfo. Many improved roads now diverge from Storo in a S.W. direction, which permit this defile to be turned and give access to Bergamo and Brescia.

Riva, to the N. of Lake Garda, is the great road junction in this region; its possession is necessary for an offensive campaign directed towards the plains of Lombardy.

At the present time defensive positions have been constructed across all these routes, and, therefore, a rapid advance along them is hardly possible. The Judicaria Pass route possesses practically the same advantages and disadvantages whether viewed from an Italian or an Austrian standpoint. Perhaps, by forcing this route the Austrians might gain slightly more than would the Italians.

The route *viâ* the Tonale Pass connects S. Tyrol to the plains of Lombardy by the Sole and Camonica Valleys. The Tonale Col (6,168 ft.) is easily defended, in spite of the existence of the secondary line of the Montezzo to its north.

There are many defensive positions between Tonale and Edolo along the upper reaches of the Camonica, these reaches are also covered by the stiff slopes of M. Adamello, a region ill-provided with roads. The Upper Camonica is connected with the Valtellina by the Mortirolo and Aprica roads, which are so situated as to admit of the movement of troops in the region most threatened.

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A seizure of Aprica by the Austrians, by laying open the Valtellina, would seriously threaten the Italian defensive positions on the Mincio.

Attention is called to the Austrian plan of campaign in this region in 1859. The Austrian VI. Corps consisted, in the year in question, of 25,000 men and was opposed by Garibaldi who had a detachment about 6,000 strong at the Stelvio Pass and another about 5,000 strong at Rocca D'Anfo. The Austrians faced the Garibaldians at the Stelvio Pass with equal numbers and kept a strong reserve at Trent. This reserve was utilized for an attack against Rocca D'Anfo with a view to a march on Solferino, while the main body of the Austrian Army was forcing the passage of the Mincio. The Franco-Italians were, under these circumstances, compelled to detach a strong force for the protection of their left flank at the time that they had to meet the Austrian main army.

The above example is of interest at the present day, for a similar situation might arise in the event of the Entente forces being compelled to give way before an Austro-German push against the front Verona-Asiago-Arsiero. It is evident that an Austro-German advance by the routes *viâ* Tonale and Aprica, through leading to dispersion, would play a characteristic *rôle* if carried out in combination with a general plan of attack in the plains of Lombardy.

The line of advance *viâ* the Stelvio Pass, the culminating point of which is near the Dreisprachenspitze (9,000 ft.) is of particular interest to the Swiss people. It connects the Val Venosta with the upper reaches of the Adda. The Col is easily defended. The Austrians are firmly established there and hold the heights both N. and S. of the Col; they thus possess the advantage here and command the valley.

The route which descends towards Bormio can be easily barred; it is covered on the N. by Switzerland, and it is difficult to turn on the S. by reason of the existence of the Cristallo and Tresero glaciers. At Tirano the valley widens and does not contract again until the Lake Como is reached. Fuentes, the position held by the Spaniards in the XVII. Century and constituting the gateway in the Grisons into Italy, consists of a rocky eminence which affords an extended view and a commanding position over the valley, on the N. as well as on the E. The approach to Milan along the banks of Lake Como is difficult; by using the roads S. of the Valtellina the Austrians might mass large numbers of troops in the Italian plains. But the Valtellina does not offer many advantages to the Austrians.

The foregoing brief sketch relating to the *lines of invasion* into Italy shows that the difficulties connected with their use increase the further westward of the Carso that an invader attempts to penetrate into Italy. It is in the E. that the most vulnerable points are to be sought for, whilst in the Trentino and in the region nearest the Swiss frontier the mountainous character of the country is such as to put many serious obstacles in the way of an Austro-German invasion.

Music in the Swiss Army.

So many reforms have been carried out in the Swiss Army since it was mobilized in the Autumn of 1914, that there is an inclination not to allow anything, however small a part it may play in the fighting machine, to

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escape revision now that an opportunity has presented itself for putting the Swiss military house in order. The author of the *Revue* article deals with certain defects in the training of musicians, buglers and trumpeters and puts forward certain suggestions with the object of removing the short-comings in the musical training of the Swiss Army to which attention is called.

NOTES AND NEWS.

Switzerland.—The *Comité de la Section vaudoise de Zofingue* has taken exception to some of the remarks published in the Notes and News in the January number of the *Revue*, in which attention was called to the wave of pacifism passing over and through Switzerland. The President of the *Comité* in question has, in consequence, addressed a letter to the Editor of the *Revue* contesting the accuracy of the statements contained in the contribution complained of.

The Editor takes the complaints made against him seriatim and demolishes the charges of the President of the *Comité* by quoting the latter's own words to prove the correctness of the remarks to which exception has been taken.

Regret is expressed that there should exist a coterie, however small, addicted to " pacifism " in the ranks of the intellectuals of Switzerland, and particularly so when the disciples of this cult belong to the *élite* of the youth of Helvetia, as do the Zofingiens.

The Editor states that he has received a second letter from a Zofingien, who takes up a stand on different ground to that taken by the President of the *Comité* in his letter. It is proposed to deal with this communication in the March number of the *Revue*.

Belgium.—A special correspondent contributes some notes dealing with the War. He reminds us that in the wars of distant ages great generals, Kings, and Emperors were accompanied in the field by their favourite actors and actresses. It is as necessary in these days of trench warfare, as was the case in the older wars of movement, to keep up the spirits of the fighting men by healthy forms of amusement. So apparently think the Belgian Higher Command. A programme of entertainments for the Belgian soldiers has been drawn up which goes far to meet the needs of the moment. The Belgian King and Queen have in this matter, as in all others affecting the welfare of the Belgian soldier, done their share in promoting the success of the scheme.

A travelling theatre has been constructed and it moves from camp to camp. The performers are the leading Stars of the theatrical profession and some of the classical masterpieces have been staged by them for the edification of King Albert's fighting men, who have much appreciated the efforts made to relieve the tedium of their existence.

Another direction in which provision is being made to cater for the amusements of the Belgian Army is in the encouragement which the Belgian G.H.Q. is giving to the " Société Symphonique Militaire." There is no country in the world richer than Belgium in musical institutions of high standing, such for example as those of Brussels, Liège, Ghent, Mons, etc. Official recognition has been given to the " Société Symphonique Militaire " and assistance rendered in connection with

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the procuring of the musical outfit. Facilities are provided for concerts, practice and instruction in the musical art, etc.

Attention is called to a steel helmèt, invented by Dr. Weekers, which is under trial on the Yser front. The helmet has been designed more particularly with a view to providing greater protection to the soldier's forehead and eyes than that obtained by the use of other types of steel helmets; it can be worn with the gas helmet, and it is claimed that it in no way prevents the soldier from using his gun and other weapons of offence and defence. Whether the helmet meets all practical requirements has yet to be determined. A thousand of these new helmets have been ordered and have been issued to the troops in the trenches. The expenses of the experiment are being borne by Queen Elisabeth; she has been playing the part of the fairy godmother of the nursery tales to the soldiers of her unhappy land, where she passes under the name of the " petite reine."

It has been known for some time that the Germans have been compelling civilian prisoners to work in the operation zone. Not satisfied with the numerous breaches of the written and unwritten codes of war of which they have been guilty and concerning which so much has already been published, it would appear that they are now systematically employing not only men, but also women and children, in the construction of military works in the operation zone. It is stated that many dead bodies of women and children have already been found at the front in this zone.

The decision of the German Government to effect the administrative separation of the Flemish and Walloon Districts of Belgium is touched upon. The spirit of resistance is abroad and the Germans may find the Belgian people as intractable in this matter as they have found them so in many another direction.

Information.

Cavalry.—A great part of the Swiss Cavalry has been collected together at a camp of instruction at Porrentruy, in connection with the training of the recently-formed Machine-Gun Squadrons. A very complete programme of instruction seems to have been prepared and carried through. Satisfaction is expressed at the progress made.

Utilization of Grease Tins.—Attention is called to the fact that Serbian soldiers have been using their empty grease tins as tea-infusers. It is suggested that Swiss soldiers might care to take advantage of the idea.

This number of the *Revue* concludes with a list of works of military interest received for review.

No. 3.—March, 1918.

The Horsed-Machine-Gun Group of the Swiss Division.

I. *Organization and Mobility.*

In the ordinary and mountain machine-gun companies of the Swiss Army animals in single-draught carts, pack-horses and mules are led by men on foot, but in the case of two-horsed vehicles drivers are employed, who drive with long reins from box-seats. With the exception of the Company Commanders, the other officers and the N.C.O.'s of these

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units are not mounted and recruit-drivers, probationary N.C.O.'s and N.C.O.'s receive no instruction in equitation.

In addition to the machine-gun company with each battalion, a horsed-machine-gun group, consisting of three companies, forms part of every Swiss Division. The officers, sergt.-majors, sergeants, and driver-corporals of the latter units are mounted and its wagons (four-horse) are driven postilion fashion; their recruit-drivers and probationary N.C.O.'s are, in consequence, taught to ride.

The horsed-machine-gun companies with the Swiss Divisions were brought into existence by a recent Law passed for the express purpose. One of these horsed-machine-gun companies is attached to each infantry brigade of the division; these companies have been provided with mobility superior to that of the machine-gun companies at present with infantry battalions, in order to facilitate their employment in open country, *i.e.* for tactical reasons.

Sub-para. (1) of para. 314 of the *Instruction provisoire pour les mitrailleurs d'infanterie* states: "The horsed-machine gun group of three companies forming part of the division may be held by the Divisional Commander at his own disposal or placed as a whole or by companies under the brigades or regiments."

It is pointed out that this instruction gives an indication to Divisional, Brigade and Regimental Commanders as to the actual value of this special organization of machine-guns.

The horsed-machine gun companies have only six guns, and in this respect do not differ from ordinary machine-gun units. On the other hand, the former possess 73 riding and draught horses as compared with the 36 with the latter. The larger number of animals, it is thought, are not justified for six guns only. On the occasion of the increase from 4 to 6 in the number of guns with horsed units alterations were made to the wagons so as to permit of two machine-guns with their shields being carried on the rearmost part of the wagons; this meant a reduction of their ammunition-carrying capacity by from 9,600 to 8,000 rounds.

The new horsed units are to be provided with six wagons, each capable of carrying two machine-guns with their shields and 8,000 rounds for short-range fighting, in addition to the six gun-wagons each carrying one machine-gun with its tripod and 8,000 rounds for long-range fighting.

In future each section of a horsed-machine-gun company will possess two guns for long-range and four guns for short-range fighting, *i.e.*, six of the former and 12 of the latter per company. This organization allows of a section being detached with both kinds of guns, or of the employment of a company as five separate sections, *i.e.*, two long-range with three guns apiece on tripods and three short-range with four guns apiece.

The view is expressed that even the contemplated increase in the number of guns to 18 in the horsed units does not justify the retention of 73 animals in the company. In the article *The Present Situation Relating to our Infantry Machine Gunners* published in the February number of the *Revue* it was shown that the number of guns with an ordinary machine-gun company from 6 to 38 would only involve an increase in the number of animals from 35 to 48.

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The great mobility of the horsed-machine-gun units was clearly demonstrated in the autumn of 1916, when from 11 to 16 machine-gun squadrons carried out exercises with their new equipment under Major Heer. The following facts were established :—

(1). That horsed machine-guns can move at the same pace (200 to 220 metres per min.) and can cover the same distances per hour ($3\frac{3}{4}$ to 5 miles per hour) as artillery—this is but $1\frac{1}{4}$ miles per hour less than that covered by dragoon regiments.

(2). That horsed machine-guns cannot keep up with the cavalry brigade to which they may be attached, but can follow close on its heels. In this respect the machine-guns are in no different a position than the artillery attached to the cavalry brigade.

3. That it is inadvisable to move at the trot with machine-guns across rough fields, ditches and along broken roads as the wagon wheels and the springs are not built strongly enough for this purpose. The result is that the horsed machine-guns are not so mobile as the cavalry machine-guns.

It must not be supposed that machine-guns can be brought into action in a manner similar to that in which field artillery comes into action ; the process is more laborious than that of merely unlimbering. When orders are given for machine-guns to come into action, the company or section is halted under cover and arrangements are there made for carrying the guns, their mountings and ammunition forward, meanwhile suitable positions are reconnoitred. And when everything is ready the positions selected should be occupied *quickly, silently, and by covered approaches.*

Capt. von Normann, of the Austrian Army, who has been in command of a machine-gun squadron for three and a-half years during the present War, has recently published a work entitled *Winke für die Ausbildung mit dem M.G. und dessen Verwendung* (Hints for training in M.G. and for their employment), wherein he states : " When M.G.'s have to be brought into action on open ground, in proximity to the enemy, I prefer to move forward after having unloaded. My reason for adopting this course is that I never have liked to incur the risk of arriving at my destination with men and ammunition, but after having lost one or several animals *en route.*"

The author of the original article expresses the opinion that it is still more imperative for the Swiss to guard against the risk of heavy losses in animals ; very few horses are bred in Switzerland and for the past $3\frac{1}{2}$ years exportation of horses into the country has been prohibited by the neighbouring Powers.

It is only when horsed machine-guns are marching on roads, at the walk and trot combined, that they move faster than the ordinary machine-guns.

It is suggested that the rate of marching can be speeded up and the animals spared by adopting the system of marching introduced 30 years ago by Colonel Bluntschli (a Bavarian Artillery Officer, at one time Editor of the *Zeitschrift für Artillerie und Genie*). This system consisted in forming up columns on the march with distances between the sections of a battery equal at least to the length of a section in column of route. The change in the pace from the walk to the trot and *vice versâ* did not

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take place simultaneously throughout the batteries of an Artillery Brigade, but at the moment that the head of each section reached a given point. This system possesses the advantage that dust trouble is reduced and that the increased pace can be confined to the short stretches of route which are suitable for covering at the trot.

II. *Value of the Horsed-Machine-Gun Group.*

In this section of the original article an examination is made into the nature of the service the horsed-machine-guns can render to their division and the question whether this service is of a kind to justify the retention of these units.

1. *The Advance.*—According as the division marches as a single column or by brigade columns the M.G. group can, as occasion requires, be sent on ahead of the infantry advanced guards at an increased pace, either as a whole or by companies, under cover of the cavalry screen of the Army or the cavalry forming part of the infantry advanced guards. Should the horsed machine-guns come into action under circumstances of this kind the cavalry can lend them assistance by providing *personnel* for replenishing the ammunition supply, loading the bands, etc. The employment of the horsed machine-guns in this manner seems to be called for in Switzerland by reason of the existence of numerous rivers and defiles.

2. *Retreat.*—Para. 172 of the Swiss *Instruction sur le service en campagne* expressly states that "*field artillery, machine guns and cavalry* are eminently suitable for employment with rear guards." It is quite evident that horsed machine-guns and cavalry machine-guns can, during a retreat, be more advantageously handled than the ordinary infantry machine-guns.

3. *Protection of Flanks and in Support.*—In the case of the immense armies employed to-day, which operate on fronts extending from one sea to another, or from the frontiers of one neutral state to that of another, the protection of the flanks of an army can no longer be secured by patrols. There can never be troops sufficient enough in number to fill in the gaps along the fronts of divisions and brigades. As was the case in the German advance towards the Somme and in that of the invasion of Russia by the Armies of the Central Powers, the intervals between the columns marching on a wide front must be filled in by troops of a kind whose lack in numbers is compensated for by their great mobility; cavalry brigades, horsed-machine-gun groups, cyclists, infantry on motor-lorries and other vehicles can all be effectively utilized for this purpose.

The foregoing examination justifies, in the opinion of the author of the original article, the retention of horsed-machine-gun groups in the Swiss Army, even though machine-gun companies have more recently been added to infantry battalions.

III. *Examples in Connection with the Employment of Horsed Machine Guns in an Advance.*

A few schemes are worked out in this section of the original article, in connection with the use of horsed machine-guns in offensive and defensive actions; the section concludes with a few general remarks on the schemes in question.

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IV. *Selection of Men and Officers.*

A. *Men.*—Capt. von Normann, in his work mentioned earlier, states: "The greatest care is required in recruiting the *personnel* for cavalry machine-guns. It is necessary to select the men as well from amongst those who volunteer for this branch of the service and exhibit an interest therein, as from those who have to be selected by lot. It must be accepted as a principle, without exceptions, that the best men are only just good enough as machine-gunners." The above remarks apply equally, says the author of the original article, to the *personnel* of the horsed-machine-gun group.

Every machine-gunner and driver in the horsed-machine-gun companies is required to possess such great self-reliance and to bear so considerable a responsibility that only absolutely trustworthy, well-educated, cool-headed and highly disciplined men are alone able to come up to the scratch in this branch of the Service. The above remarks apply equally to the N.C.O.'s. Machine-gunners should be a *troupe d'élite*, since every machine-gunner ought to be capable of effectively handling a weapon which costs 40 to 60 times the price of a rifle and can do 40 to 60 times as great execution.

Swiss machine-gunners must take the place in the infantry which the Carbineers have had to surrender.

B. *The Officers.*—Only those premier-lieutenants who have been noted as being qualified for the command of a company should be posted to the horsed-machine-gun companies. They should, as a rule, be drawn from the officer-instructor class who have been through a course of equitation and horse-management.

It is suggested that cavalry officers, who have successfully commanded machine-gun squadrons, should also be posted to horsed-machine-gun groups. The two arms would thus be brought into closer contact to their mutual advantage.

The original article is accompanied by a number of photographic reproductions showing machine-guns in action.

The Ceremonial Step.

The author of the original article states that the article dealing with the *morale* of the Swiss Army which appeared in the number of the *Revue* for January, 1918 (*vide R.E. Journal* for May, 1918), describes with frankness and accuracy the uneasiness that prevails at the present day in the Swiss Army. He approves generally of the measures therein recommended to increase the Swiss soldier's interest in his profession by modifying his training so as to conform to the requirements of war as carried on to-day. He points out that it would be wrong to suppose that nothing had been done in this matter; on the contrary, in one division of the Swiss Army, which was mobilized in August last, special attention has been directed to trench warfare and its Commander has announced that in his inspections he will devote his attention exclusively to the training given in this branch of the soldier's education.

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It is admitted, however, that the progress made in modifying training to meet the latest requirements is not as great as it might have been and that the discontent in the Swiss Army is increasing. The author of the original article suggests that reform in the Swiss Army should begin by abolishing the *pas cadencé* (the German *paradeschritt*) as the ceremonial step for parade purposes. In making this recommendation, he recognizes that he may be looked upon as a heretic by certain Swiss military enthusiasts. Although he advocates the abolition of the *pas cadencé* as a parade step, nevertheless, he recognizes that it has its value from the point of view of the development of the muscles of the leg and he has no objection to its retention as a gymnastic exercise. He points out that in the march past during inspections the Swiss soldier feels himself the subject of ridicule by being made to adopt a method of marching which is contrary to Swiss instinct. A large part of the Swiss population being mountaineers they cannot readily imitate the Prussian kick and therefore a great deal of time has to be spent at *drill* for the mere purpose of perfecting the men in this method of marching; to this is due in some measure the discontent prevailing in the Swiss Army.

A War Anatomical Museum.

The Inter-Allied Medico-Surgical Conference, to which reference was made in the number of the *Revue* for November, 1917, has already produced useful results; valuable statistical information has been rendered generally available, comparisons have been effected of the various methods employed in treating wounds, dealing with fractures, etc. The superiority of some of the methods over others has thus been definitely established. All this possesses an advantage from the military point of view; it tends to the bringing about of a more rapid recovery of the wounded and also to the cure of those who would otherwise have been lost to the Military Service. But an advantage also accrues from a humanitarian point of view, a matter of immense importance to society at large; those that are crippled in war are, by the utilization of the knowledge gained by the interchange of ideas, rendered more efficient in their capacity as civilians, and consequently their earning powers are thereby correspondingly increased when the time arrives for them to put aside their khaki and don mufti.

Aural instruction is at all times profitable, but visual instruction is often more striking, more impressive and becomes more deeply graven on the human memory. For this reason the "Royal College of Surgeons of England" is to be congratulated on the step taken by it in establishing a permanent collection of things connected with war surgery. Although it has been in existence but a very short time, the exhibits have increased so rapidly that the collection is already considered one of the most useful educative means at the disposal of the medical profession.

A short description of the collection is given in the original article, and it is suggested that in view of their importance and interest the exhibits should become the nucleus of an International Exhibition relating to War Surgery.

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Notes and News.

Switzerland.—The discussion on pacifism begun in the number of the *Revue* for January, 1918, is continued. In a letter to the *Editor* from a Zofingien dated Zurich, 29th January, 1918, published in this number of the *Revue*, its writer explains the mentality of the youth of Switzerland concerning which, he alleges, ignorance prevails and there is much misunderstanding. "Pacifism and the Abolition of the Army" is a question which is occupying a prominent position in the minds of Swiss 'Varsity students. It is stated in this letter that "far from aiming at a social revolution, we are seeking by methods of evolution to bring about a new cohesion, and that without lending ourselves to mysticism or any extravagant Utopian ideas. So far as it may be necessary to defend ourselves as a collective whole, an army is, we recognize, a necessity, and we would be the first to lend it our support. What we desire is not that we should give up the right to defend ourselves, but rather that we should render the army useless by getting rid of the possibility of an attack on us by any Power whatsoever. In our capacity as individuals we will always have to fight in order to live, since passions enter into the composition of individuals and they are capable of harbouring hate. A nation as a whole cannot rouse itself into a passion at white heat; it never desires a war; and on the day that a community is able to control its own acts, and is no longer at the mercy of a few individuals, war will no longer be possible and armies can then be suppressed. An Arbitral Tribunal, with or without international police, will suffice to dispose of the differences and disputes between democracies, etc., etc."

The *Editor* examines this remarkable document and points out the self-evident contradictions therein. He asks the writer to furnish him with evidence—not from personal convictions inspired by kindness of heart but from the lessons of history and psychology—to support the following views:—

(1). That a nation, as a whole, cannot rouse itself into a passion at white heat.

(2). That a democracy never desires war.

(3). That a community will be able to control, or at least sufficiently to control, its own acts, so as not to be under the domination of the Government elected by it, in other words that it will no longer be at the mercy of a few individuals.

(4). That the rights of a community, any more than those of individuals, are capable of being maintained without the *sanction* of the gendarme and by the mere award of a few arbitrators.

The writer of the letter in question is referred to publications innumerable issuing from the Press to-day, where he will find facts recorded which prove that abundant evidence exists to demolish every one of his cherished tenets on war and on the psychology of democracies.

It is announced that a third letter has been received on the above subject from the Zofingiens of Neuchatel. It simply gives in its adhesion to the protest from the "Section Vaudoise" published in the number of the *Revue* for February last.

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Portugal.—A special correspondent deals with the Portuguese Military Budget for 1917. Reference is made to the Portuguese Division sent to France as a visible and tangible evidence of the loyalty and sympathy of Portugal for France. On the departure of this division, a second division was mobilized at Lisbon.

At the beginning of 1917, the French Government asked the Portuguese Government for support. In consequence, a military convention was entered into between the two countries, whereby Portugal undertook to raise and maintain a Corps of Heavy Artillery, of not less than 15 and not more than 30 batteries. The armament for this corps was supplied by the French Government.

The struggle in Africa has, since the beginning of the War, absorbed from 30,000 to 35,000 men of the Portuguese European Army; including the Colonial and native troops, some 45,000 men have been taking part in the operations in Africa.

The differences which brought into existence two camps in Portugal—the interventionists and the non-interventionists—are subsiding. The importance of the step Portugal took in coming into the War, and its bearing on international politics, are now fully recognized. A small country, such as Portugal, possessing as it does a vast Colonial Empire, must, it is realized, attach itself to one or other of the Allied groups.

INFORMATION.

Switzerland.—A description and particulars are given of a heating device, consisting of impregnated paper, which has been in use in the Serbian Army.

This number of the *Revue* concludes with a Bulletin Bibliographique.

A further part of the *Supplement* containing M. Epuy's translation of Lord Ernest Hamilton's *The First Seven English Divisions* accompanies this number of the *Revue;* the narrative is brought down therein to the events connected with the "Second Advance"—23-26 October, 1914.

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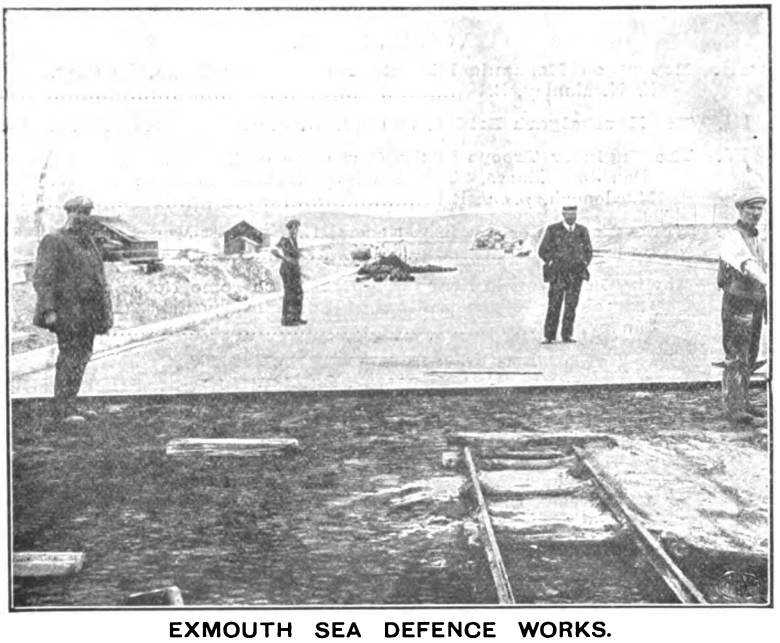

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